Vol. 9, No. 6
March 31, 1984

Energy Research Abstracts

Abstracts 9218-11399

Technical Information Center
UNITED STATES DEPARTMENT OF ENERGY

CURRENT AWARENESS PUBLICATIONS ON ENERGY

To provide complete coverage of literature related to major Department programs, announcement publications that are comprehensive in their coverage of certain energy fields are issued regularly. All information in these publications, plus additional backup information, is included in the Energy Data Base of the Technical Information Center; all references are also available for machine searching via the on-line retrieval system, DOE/RECON, and the commercial on-line retrieval systems. Descriptions of these current awareness publications, which are supported either directly or indirectly by the DOE, appear below. Department of Energy components may receive the listed publications free from the Technical Information Center, P. O. Box 62, Oak Ridge, TN 37831. Telephone (615) 576-1303; FTS 626-1303.

PUBLICATIONS OF THE TECHNICAL INFORMATION CENTER

Energy Abstracts for Policy Analysis (EAPA)

A monthly abstract journal devoted to the analysis of energy research, conservation, and policy. Scope and coverage are limited to substantive articles or reports and emphasize the following programmatic efforts; legislative, regulatory, and other legal aspects, social, economic, and environmental impacts; regional and sectoral analyses; institutional factors, etc. *EAPA* is available from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402; domestic subscribers $6.00, foreign $7.50 per copy; annual cumulative index, domestic $10.00, foreign $12.50 per copy. The annual subscription price is $70.00 for domestic subscribers and $87.50 for foreign subscribers.

Energy Research Abstracts (ERA)

A comprehensive semimonthly abstract journal devoted to all areas of energy-related information produced by the Department of Energy, other U. S. government organizations, and foreign governments. *ERA* is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign).

DOE Patents Available for Licensing (PAL)

DOE is prepared to grant exclusive or nonexclusive, revocable licenses under DOE-owned U. S. patents and patent applications; this semiannual publication provides abstracting and indexing coverage of this literature. *PAL* is available on subscription as PB84-946800 from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, VA 22161. The annual subscription price is $14.00 for domestic subscribers and $28.00 for subscribers outside the North American continent; prices for single issues are $7.00 and $14.00, respectively.

The following monthly update journals are available to the public on subscription from the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161; use the identifying order number (PB- No.) when subscribing. The annual subscription rate for one volume (calendar) year (12 issues plus cumulative index) is $75.00 for domestic (North America) and $150.00 for foreign (outside North America) subscribers. A single issue is $7.00 (domestic) and $14.00 (foreign).

***Current Energy Patents (CEP)*–PB84-902800**

Provides coverage of the international patent literature, including patent applications, that concerns any aspect of energy production, conservation, and utilization.

***Energy and the Environment (EAE)*–PB84-914900**

Devoted to information on the impacts of energy-related activities and radioactive and nonradioactive pollutants on the environment.

***Fossil Energy Update (FEU)*–PB84-914600**

Devoted to information on the exploration, development, processing, and use of fossil fuels.

***Fusion Energy Update (CFU)*–PB84-915300**

Devoted to information on controlled thermonuclear fusion, including plasma and fuel research and power plant engineering and conceptual design studies.

***Solar Energy Update (SEU)*–PB84-914500**

Devoted to information on the utilization of solar energy, including biomass and tidal and wind power.

The following semimonthly bulletins are also available from the National Technical Information Service (NTIS). The annual subscription rate for one volume (calendar) year (24 issues; no indexes) is $40.00 for domestic subscribers and $80.00 for subscribers outside the North American continent; use the identifying order number (PB- No.) when subscribing.

***Acid Precipitation (APC)*–PB84-901000**

Covers all aspects of acid precipitation, including effects and possible control measures.

***Coal-Based Synfuels (CBS)*–PB84-901400**

Covers all aspects of conversion of coal into gaseous or liquid fuels.

***Coal Preparation and Pollution Control (CPC)*–PB84-900800**

Covers all aspects of coal preparation and cleaning and reducing pollution from its direct combustion.

***Direct Energy Conversion (DEC)*–PB84-946600**

Covers the following areas: photovoltaics, magnetohydrodynamics, electrohydrodynamics, thermoelectrics, thermionics, and fuel cells.

***Geothermal Energy Technology (GET)*–PB84-914700**

Devoted to information on the exploration, development, and utilization of geothermal resources.

***Laser Research (LAR)*–PB84-901100**

Covers all aspects of laser research and development, but excludes applications.

***Nuclear Fuel Cycle (NFC)*–PB84-913400**

Covers all aspects of the nuclear fuel cycle, both front end and back end.

***Nuclear Reactor Safety (NRS)*–PB84-913500**

Covers the following safety aspects: accident analysis, safety systems, radiation protection, decommissioning and dismantling, and security measures.

***Radioactive Waste Management (RWM)*–PB84-902900**

Covers the following management aspects: transport and storage, waste processing, waste disposal, waste storage, radioactive effluents, and shipping containers.

***Solar Thermal Energy Technology (STT)*–PB84-901200**

Covers research in materials, concentrators/receivers, salinity gradients, etc., for development of efficient and reliable solar thermal conversion systems.

***Unconventional Petroleum (UCP)*–PB84-901300**

Covers all aspects of secondary and tertiary recovery of petroleum and of oil shales and tar sands.

INTERNATIONAL ENERGY PUBLICATIONS

The Technical Information Center cooperates with the following organizations in the publication of international abstract journals: (1) International Atomic Energy Agency, International Nuclear Information System, Vienna, Austria, for *Atomindex;* (2) International Energy Agency, IEA Coal Research, London, England, for *Coal Abstracts;* and (3) International Energy Agency, Biomass Conversion Technical Information Service, Dublin, Ireland, for *Biomass Abstracts.* In each case, the cognizant foreign agency provides the non-U.S. information to TIC for inclusion in the Energy Data Base; in turn, TIC provides the U.S. information for input into the respective journal.

Atomindex

A semimonthly abstract journal providing worldwide coverage of information on nuclear science and technology. *Atomindex* is available by subscription from UNIPUB, 345 Park Avenue South, New York, NY 10010. The cost of an annual subscription, 24 semimonthly issues and semiannual and annual cumulative indexes, is $290.

Biomass Abstracts

A bimonthly abstract journal with comprehensive coverage of information in any step involved in the eventual conversion of biomass to energy. *Biomass Abstracts* is available free to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Biomass Abstracts* from Biomass Conversion Technical Information Service, Institute for Industrial Research and Standards, Ballymun Road, Dublin 9, Ireland, for 42 IR pounds per year. Make checks payable to the Institute.

Coal Abstracts

A monthly abstract journal providing comprehensive worldwide coverage of information in the field of coal science and technology. *Coal Abstracts* is available to Department of Energy components and contractors from the Technical Information Center. Non-DOE organizations may obtain *Coal Abstracts* from IEA Coal Research, Technical Information Service, 14-15 Lower Grosvenor Place, London SW1W 0EX, England, for 100 pounds sterling per year.

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ENERGY RESEARCH ABSTRACTS

ABOUT THE TECHNICAL INFORMATION CENTER

The Technical Information Center in Oak Ridge, Tennessee, has been the national center for scientific and technical information for the Department of Energy (DOE) and its predecessor agencies since 1946. In developing and managing DOE's technical information program, the Center places under bibliographic control not only DOE-originated information but also worldwide literature on scientific and technical advances in the energy field and announces the source and availability of this information. Whereas the literature of science is emphasized, coverage is extended to DOE programmatic, socioeconomic, environmental, legislative/regulatory, energy analysis, and policy-related areas. To accomplish this mission, the Center builds and maintains computerized energy-information data bases and disseminates this information via computerized retrieval systems and announcement publications such as abstracting journals, bibliographies, and update journals. Direct access to the Center's most comprehensive data base, the Energy Data Base, is available to the public through commercial on-line bibliographic retrieval systems. The Energy Data Base and many of the Center's energy-related data bases are available to DOE offices and contractors and to other government agencies via DOE/RECON, the Department's on-line information retrieval system. The Center has developed and maintains systems to record and communicate energy-related research-in-progress information, to maintain a register of DOE public communications publications, to track research report deliverables from DOE contractors, and to test and make available DOE-funded computer software programs with scientific and management applications. The Center also maintains a full-scale publishing capability to serve special publication needs of the Department. To effectively manage DOE's technical information resources, the Center's program is one of continual development and evaluation of new information products, systems, and technologies.

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ABOUT *ENERGY RESEARCH ABSTRACTS*

Energy Research Abstracts (ERA) provides abstracting and indexing coverage of all scientific and technical reports, journal articles, conference papers and proceedings, books, patents, theses, and monographs originated by the U. S. Department of Energy, its laboratories, energy centers and contractors. *ERA* also covers other energy information prepared *in report form* by federal and state government organizations, foreign governments, and domestic and foreign universities and research organizations. The user should remain aware that *ERA* coverage of non-report literature is limited to that generated by Department of Energy activity.

ERA is comprehensive in its subject scope, encompassing the DOE's research, development, demonstration, and technological programs resulting from its broad charter for energy sources, supplies, safety, environmental impacts, and regulation.

ERA is available on an exchange basis to universities, research institutions, industrial firms, and publishers of scientific information. Inquiries should be directed to the Technical Information Center, P. O. Box 62, Oak Ridge, Tennessee 37831.

ERA is available to the public on a subscription basis from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402. The subscription rate for the 24 semimonthly issues is $165.00 for domestic subscribers and $206.25 for foreign subscribers. A single issue costs $9.50 (domestic) or $11.90 (foreign). The cumulative indexes will be available in printed form from the Superintendent of Documents, U. S. Government Printing Office, Washington, D. C. 20402, and in microfiche form from the National Technical Information Service, U. S. Department of Commerce, Springfield, Virginia 22161, and from Engineered Systems, P. O. Box 866, Oak Ridge, Tennessee 37831.

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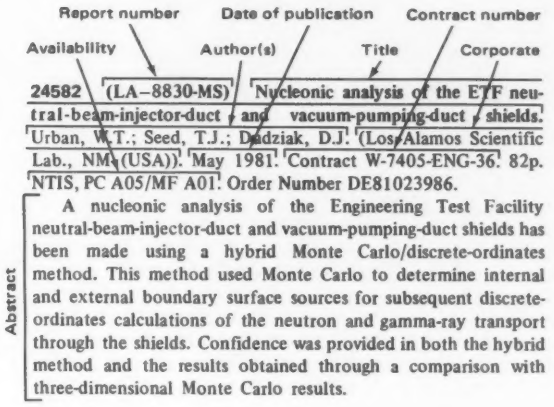
HOW TO USE *ENERGY RESEARCH ABSTRACTS*

ABSTRACTS IN *ENERGY RESEARCH ABSTRACTS*

The principal elements of abstract entries for a typical research and development report and a typical technical journal article are illustrated below.


Report number
Date of publication
Contract number
Availability
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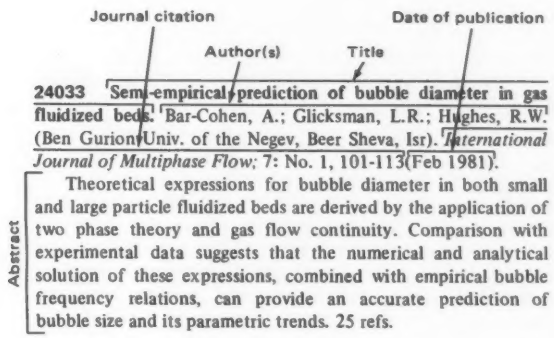
Corporate
24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. (Los Alamos Scientific Lab., NM (USA)). May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.
Abstract
A nucleonic analysis of the Engineering Test Facility neutral-beam-injector-duct and vacuum-pumping-duct shields has been made using a hybrid Monte Carlo/discrete-ordinates method. This method used Monte Carlo to determine internal and external boundary surface sources for subsequent discrete-ordinates calculations of the neutron and gamma-ray transport through the shields. Confidence was provided in both the hybrid method and the results obtained through a comparison with three-dimensional Monte Carlo results.


Journal citation
Date of publication
Author(s)
Title
24033 Semi-empirical prediction of bubble diameter in gas fluidized beds. Bar-Cohen, A.; Glicksman, L.R.; Hughes, R.W. (Ben Gurion Univ. of the Negev, Beer Sheva, Isr). International Journal of Multiphase Flow; 7: No. 1, 101-113 (Feb 1981).
Abstract
Theoretical expressions for bubble diameter in both small and large particle fluidized beds are derived by the application of two phase theory and gas flow continuity. Comparison with experimental data suggests that the numerical and analytical solution of these expressions, combined with empirical bubble frequency relations, can provide an accurate prediction of bubble size and its parametric trends. 25 refs.

INDEXES TO *ENERGY RESEARCH ABSTRACTS*

Five indexes are provided for approaching the contents of each issue of *Energy Research Abstracts (ERA)*. Each index is preceded by an introduction that details the organization of the index and the principles by which it was compiled. The reader is referred to these introductions for information not found in the index examples that follow.

• Corporate Author Index

Technical report literature is indexed using the name of the organization or institution responsible for the issuance of the report.

24582 (LA–8830-MS) Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields. Urban, W.T.; Seed, T.J.; Dudziak, D.J. **(Los Alamos Scientific Lab., NM (USA)).** May 1981. Contract W-7405-ENG-36. 82p. NTIS, PC A05/MF A01. Order Number DE81023986.

is indexed as:

Los Alamos Scientific Lab., NM (USA)
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Personal Author Index

Each author's name is indexed in the form appearing on the document abstracted, with the exception that given names are reduced to initials:

Bar-Cohen, A., Semi-empirical prediction of bubble diameter in gas fluidized beds, 7:24033 (J:US)
Dudziak, D.J., *See* Urban, W.T., 6:24582
Glicksman, L.R., *See* Bar-Cohen, A., 7:24033
Hughes, R.W., *See* Bar-Cohen, A., 7:24033
Seed, T.J., *See* Urban, W.T., 6:24582
Urban, W.T., Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Subject Index

The subject index consisting of entries naming specific materials, objects, and processes is arranged alphabetically. Document titles, informative phrases, or both specific to these entries are arranged alphabetically under the entries.

TOKAMAK ETF
Neutral Atom Beam Injection
Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)
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Nucleonic analysis of the ETF neutral-beam-injector-duct and vacuum-pumping-duct shields, 6:24582 (R:US)

• Contract Number Index

DOE technical literature is indexed using contract numbers under which the literature was produced. This index contains the contract number with corresponding abstract and report numbers.

W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
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• Report Number Index

Technical report literature is also indexed using report numbers. This index includes information on where individual reports may be obtained. Patents and conference papers are indexed here as a matter of convenience. When a report is supplied under an Order Number, that number is included in the availability statement. An Order Number–Report Number Correlation is included for convenience.

LA–		
8830-MS	6:24582	**NTIS, PC A05/MF A01. Order Number DE81023986, Distribution Category STD-20d**

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SUBJECT CONTENTS (NUMERICAL LISTING)

Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts.* The following listing includes the totality of the 40 first-level and 293 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope definitions and limitations is available as DOE/TIC-4584-R5 from NTIS for $9.50.

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Six-digit subject category numbers are used in the storage, retrieval, and manipulation of bibliographic information entered into DOE's computerized bibliographic information system. The six-digit category numbers are utilized as if they were three pairs of two-digit numbers, the first two pairs being used to arrange the abstract content of *Energy Research Abstracts*. The following listing includes the totality of the 40 first-level and 293 second-level subject categories used. Because each issue of *ERA* announces only those documents becoming available during a semimonthly period, some subject categories may not be represented in every issue. The complete subject category scheme with scope definitions and limitations is available as DOE/TIC-4584-R5 from NTIS for $9.50.

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9218 (DOE/FE/50037—T1) Support service to the Office of Oil, Gas, Shale and Coal Liquids. Final report. (Pyros, Inc., Gaithersburg, MD (USA)). Oct 1983. Contract AC01-82FE50037. 226p. NTIS, PC A11/MF A01. Order Number DE84002770.

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The material contained in this final report is a summary of the support provided by Pyros under DOE Contract Number DE-AC01-82FE50037 in support of Fossil Energy's (FE's) Office of Oil, Gas, Shale, and Coal Liquids (OGSCL). The primary objectives were to provide expert technical, scientific, and engineering analyses specific to: technical support to the line divisions; quick response technical and analytical support; identification of program gaps, overlaps, and areas inconsistent with FE policy; assistance in evaluating current program accomplishments and establishing new program objectives/milestones consistent with FY 1983 and FY 1984 budget guidance; technical support to the Great Plains monitoring group; expert technical, scientific, and engineering analysis specific to new OGSCL R and D strategies; conference/advisory committee support; and environmental, health, safety, and socioeconomic (EHS and S) technical support. The report is divided into five major areas: a listing of the meetings Pyros attended as a representative of OGSCL; a listing of documents reviewed and commented upon by Pyros; a synopsis of technical activities performed by Pyros; the major deliverables submitted under this contract; and Appendix A - a listing of all memoranda published by Pyros under this contract.

9219 (ICTIS/RES—04) Coal research projects - North and South America. Jackson, L.J. (comp.). (International Energy Agency Coal Research, London (UK)). Dec 1983. 606p. NTIS (US Sales Only), PC A99/MF A01. Order Number DE84900571.

This volume contains a compilation of 3152 research projects in progress or completed in the last six years on all aspects of coal science and technology in North and South America. The projects are presented in broad subject groups which are displayed on the Contents page. The subjects covered are: general aspects of the coal industry (energy policy, marketing and economics, regulations), coal reserves and exploration, mining, preparation, transport and handling, processing and conversion, combustion and power generation, waste management, environmental aspects, coke and other products, health and safety. Within each subject group, the projects are arranged in alphabetical order by country and then by organisation. For each project, the following information is given where it could be found: Organisation principally responsible for performing the research, division, section or department of organisation, address, country, and telephone number; Collaborating Organisation(s) with their addresses and telephone numbers, project title, additional information about the project - summary, objectives etc., contract or project number by which the project is identified by the funding body, research worker(s), sponsoring organisation(s), funding and/or manpower, project monitor(s) and telephone number, starting date - completion date (N.B. Format of date varies, e.g., September 1982, September 1982, 8209), and codes for source(s) of information about project. Indexes of research workers, research organisations, sponsors, project numbers and subject, and a list of the sources of information follow the projects. Comments, questions and suggestions relating to this work will be welcomed and should be addressed to: Lindsey J. Jackson, Technical Information Service, IEA Coal Research, 14/15 Lower Grosvenor Place, London SW1W 0EX.

9220 (ANL/MST—83-2) Analysis of a failed separation cyclone from the Dow Chemical Corporation slagging coal gasification plant. Diercks, D.R. (Argonne National Lab., IL (USA)). Nov 1983. Contract W-31-109-ENG-38. 21p. NTIS, PC A02/MF A01. Order Number DE84004471.

A failed Type 310 stainless steel cyclone separator from Dow Chemical's 12-ton-per-day slagging air-blown gasifier pilot plant located near Plaquemine, LA has been analyzed. Samples of material from the upper portion of the cyclone were found to be deformed, heavily oxidized at the inner surface, and extensively perforated by flaws and cracks which had initiated at the inner surface. The sample from the lower portion of the cyclone was not significantly deformed, was less heavily oxidized, and was not perforated. A three-layer oxide was found on the inner surface of the cyclone, with the top-most layer containing ash particles embedded in Fe_3O_4, the intermediate layer consisting of mixed iron and chromium oxides, and the bottom layer consisting almost entirely of chromium oxide. The failure is attributed to the combined effects of high-temperature oxidation and erosive wear at the inner surface, with no significant contribution to failure by sulfidation. It is recommended that for increased life the cyclone be lined with a high-alumina castable refractory lining of the sort used for erosive-wear resistance in petrochemical plants and other coal gasifiers.

9221 (DOE/ET/10069—T79) EDS coal liquefaction process development. Phase V. ECLP industrial hygiene program - II. (Exxon Research and Engineering Co., Florham Park, NJ (USA)). Oct 1983. Contract FC05-77ET10069. 123p. (FE—2893-119). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84005208.

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This report documents the industrial hygiene program activities during the second year of ECLP operations, from July 1981 to August 1982. This includes data gathered during operations on Wyoming subbituminous coal, Illinois No. 6 bituminous coal, and Texas lignite, all in the bottoms recycle mode. This report also documents all data gathered from the turnarounds conducted during the two year operating life of the ECLP. The data in this report, combined with the data on the first year of operation (Illinois No. 6 once-through mode), as presented in Interim Report No. FE-2893-96, form the basis for the final assessment of the industrial hygiene activities reported here. This report also documents other aspects of the occupational health program at ECLP.

9222 (DOE/ET/13536—T2) Evaluation of acoustic emission weld monitoring for coal gasification vessels. Final report, September 1979-March 1982. Prine, D.W. (GARD, Inc., Niles, IL (USA)). [nd]. Contract AC01-79ET13536. 64p. NTIS, PC A04/MF A01. Order Number DE82017162.

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This report presents results of a 30 month program to evaluate the application of in-process acoustic emission monitoring to the narrow-gap hot wire gas tungsten arc welding of heavy section A387 (2-1/4 Cr, 1 Mo) steel. The welding process was developed by Westinghouse Electric Corporation for application to the field fabrication of vessels for coal gasification. The experimental results show that AE is an effective in-process NDE tool. The acoustically quiet nature of the process allows AE monitoring at very high sen-

sitivity and consequentally, allows very small weld imperfections to be detected. Furthermore, significant flaws can be easily detected at considerably lower sensitivity. The ability of AE to discriminate between crack related and other non-cracking phenomena was also demonstrated. 22 figures, 3 tables.

9223 **(DOE/ET/13546—T1) Corrosion of metals in coal liquefaction processes. Final report.** Prager, M.; Lyle, F.F. Jr.; Adams, L.M. (Metal Properties Council, Inc., New York (USA); Southwest Research Inst., San Antonio, TX (USA)). 27 May 1983. Contract AC05-79ET13546. 142p. NTIS, PC A07/MF A01. Order Number DE84004874.

This report describes a research program which was conducted to determine the factors governing corrosivity of coal liquefaction process liquids to iron-base and nickel-base alloys. The principal objectives of the program were: to identify and measure concentrations of corrosive species present in coal liquefaction process liquids; and, to relate the concentrations of corrosive species in these liquids to the corrosion rates of iron-base and nickel-base alloys exposed in the liquids. Results of corrosion tests at 500°F indicate that corrosion rates of alloys decrease as the chromium content of the alloys increases. Statistical analyses of tests on carbon steel at 500°F indicate that the concentrations of phenols, water, water-soluble chlorides, and total nitrogen determine corrosion rate in a coal liquefaction process liquid. Tests in synthetic solutions and in coal liquids indicate that water-soluble amine hydrochlorides must be present for corrosion of carbon steel to occur and that the corrosion rate of carbon steel strongly depends upon the concentration of amine hydrochlorides in the liquid; other water-soluble chlorides (e.g., NaCl and $CaCl_2$) had no significant effect on the corrosion rate of carbon steel. Tests in synthetic solutions containing amine hydrochlorides show the effects of phenol, total nitrogen, the interaction between total nitrogen and phenol, and the interaction between water and total nitrogen to be statistically significant (at the 75% level) with respect to the corrosion rate of carbon steel.

9224 **(DOE/ET/14842—T24) Coal slurry pump development. Fossil energy annual summary technical information report.** Wong, G.S. (Rockwell International Corp., Canoga Park, CA (USA). Rocketdyne Div.). 31 Oct 1983. Contract AC03-79ET14842. 10p. NTIS, PC A02/MF A01. Order Number DE84002834.

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The Coal Slurry Pump Development Program was initiated in October 1979, and was completed 15 December 1983. In the first phase of the program (Phase IIB), an experimental prototype of a two-stage, high pressure, centrifugal slurry pump was fabricated and assembled into a test unit. In the second phase (Phase IIC), the experimental pump was delivered to a slurry test facility prepared at the Colorado School of Mines Research Institute (CSMRI) and initial testing in hot oil and subsequent testing in a coal-oil slurry environment were completed. During the test program, Rocketdyne supplied technical support and coordination on test facility interface requirements and directed testing of the experimental pump to evaluate hydraulic performance, and wear life characteristics. 3 figures, 3 tables.

9225 **(DOE/MC/19163—T11) Great Plains ASPEN model development. Technical progress report, November 1-30, 1983.** (Scientific Design Co., Inc., New York (USA)). 13 Dec 1983. Contract AC21-82MC19163. 329p. NTIS, PC A15/MF A01. Order Number DE84005069.

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During the period 11/1/83 through 11/30/83 work on this project was reduced in order to prepare papers for the Systems Simulation Symposium held in Morgantown, W.Va. A limited amount of work was performed on the following tasks: Task No. 1 simplified models and task No. 4 rigorous models; Task No. 2 review of existing gasifier models; and Task No. 5 evaluation and upgrading of the Aspen cost estimation and economic evaluation system.

9226 **(DOE/MC/19163—T12) Great Plains ASPEN model development. Technical progress report, October 1, 1983-October 31, 1983.** (Scientific Design Co., Inc., New York (USA)). 8 Nov 1983. Contract AC21-82MC19163. 438p. NTIS, PC A19/MF A01. Order Number DE84004472.

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During the period October 1, 1983 to October 31, 1983 work was performed on the following tasks: Task No. 1 simplified models and Task No. 4 rigorous models; and Task No. 5 evaluation and upgrading of the ASPEN cost estimation and economic evaluation system. The Steam Generation areas of sections 5500 and 5100, of the Great Plains project, have been simulated on ASPEN. Separate simulation runs were made using the RSTOIC and the RGIBBS models to represent the Waste Fuel Boilers and Steam Superheaters. The RSTOIC assumes complete combustion while RGIBBS determines the quantities of species present in the off-gas. RGIBBS requires much more time to converge because of the complexity of the equations which must be solved and because of an additional external Design-Spec which is required for adiabatic operations. RSTOIC suffices for determining fuel requirements while RGIBBS is used in environmental studies. The Steam Distribution Area is currently under development and will be merged with the Steam Generation Area at a later date. Details of the simulation are included in this report.

9227 **(DOE/PC/40781—T9) Catalytic coal liquefaction. Quarterly report, October-December 1983.** Weller, S.W. (State Univ. of New York, Buffalo (USA). Dept. of Chemical Engineering). 1983. Contract FG22-81PC40781. 9p. (FE—2013-26). NTIS, PC A02/MF A01. Order Number DE84004751.

Autoclave tests have been performed in which surfactants of various types were added to a coal-tetralin mixture before liquefaction. Contrary to a literature report, none of the surfactants tested resulted in any significant improvement in coal liquefaction. Preliminary experiments have been done to compare the effectiveness, in liquefaction, of (a) Mo supported on an acidic, shape-selective zeolite (HZSM-5) with (b) Mo supported on alumina, or (c) Mo impregnated on coal. Early results, which will have to be replicated, suggest that 0.1% Mo on HZSM-5 may be an attractive catalyst: the liquefaction was almost as high as Mo impregnated on coal, H_2 consumption was less, and the ratio of (oil + gas):asphaltene was higher.

9228 **(DOE/PC/40787—T3) Enthalpy measurement of coal-derived liquids. Final report, April 1981-September 1983.** Kidnay, A.J.; Yesavage, V.F. (Colorado School of Mines, Golden (USA). Dept. of Chemical and Petroleum Refining Engineering). 10 Nov 1983. Contract AC22-81PC40787. 516p. NTIS, PC A22/MF A01. Order Number DE84003687.

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This report summarizes the results of experimental measurements of enthalpies for quinoline using a freon boil-off flow calorimeter, and an investigation of the applicability of cubic equations of state to correlating the enthalpy of coal-liquids. In Part A the compound quinoline is discussed. Process flow in the flow calorimeter, operational problems, and equipment modifications are described. Procedural modifications, including a new sample purification procedure, are described. Part B discusses the correlational effort. This includes a discussion of past correlational work and the difficulties associated with a general correlation for coal liquid enthalpy. In addition experimental data and computer generated predictions are presented. Three equations of state were used to predict vapor pressures and enthalpies for ten pure component systems previously studied in the lab. In general, the results were encouraging. All three equations were found to be effective in predicting both enthalpies and vapor pressures. In addition, the equations worked well when fit to mixture enthalpies. The Modified SRK equation was found to be superior to the other equations and modeled all properties for both associating and nonassociating systems well. The Modified SRK equation did have a drawback in that it was not readily generalized since it required two parameters which must be fit to data for best results. In sum, it was shown that

a four parameter equation of state could be used successfully to correlate the enthalpy of coal-liquid model compounds.

9229 **(DOE/PC/40797—T2) Study of multiphase flow useful to understanding scaleup of coal liquefaction reactors. Technical progress report, September 1-November 30, 1983.** Knickle, H.N. (Rhode Island Univ., Kingston (USA). Dept. of Chemical Engineering). Dec 1983. Contract FG22-81PC40797. 44p. NTIS, PC A03/MF A01. Order Number DE84004226.

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Bubble size and specific interfacial area studies were made in a 33 cm diameter bubble column for the carboxymethyl cellulose (CMC) aqueous solution - air system using a 70 μm porous plate gas distributor. The bubble column was operated in bubble and Bubble-Slug flow patterns. The Bubble to Bubble-Slug transition occured within superficial gas velocities of 1 to 5 cm/s depending upon the CMC concentration. The transition at higher superficial gas velocity occurred for the most diluted solution. Gas holdup decreased with CMC concentration and exhibited a maximum at the Bubble to Bubble-Slug transition zone. The maximum diminishes with CMC concentration, and appears to vanish for highly concentrated solutions. Results for gas holdup are in fair agreement with those from Schumpe and Deckwer but have large differences for the maximum values. Bubble size was found to be smaller near the column wall and bigger at R/2 and it always increased with superficial gas velocity or CMC concentration. Finding bubble size distributions at high superficial gas velocities and/or highly concentrated CMC solutions was not successful due to some limitations in the photographic equipment. For low and moderate CMC concentrations; it is recommended to work near the bubble to bubble-slug transition where the specific interfacial area exhibits a maximum. This maximum diminishes with increased CMC concentration and eventually vanishes with highly concentrated solutions. The method for evaluation of specific interfacial area taking into account the bimodal distribution found in this study is more accurate than methods using only a mean bubble diameter even if this average is calculated from accurate bubble size distributions as in Buchholz et al.

9230 **(DOE/PC/40812—T9) New catalysts for coal liquid upgrading. Quarterly report, September 1-November 30, 1983.** Boucher, L.J. (Western Kentucky Univ., Bowling Green (USA). Dept. of Chemistry). 1983. Contract FG22-81PC40812. 9p. NTIS, PC A02/MF A01. Order Number DE84004738.

The objective of this project is to develop thermally stable, poison-tolerant catalysts that will be effective under moderate conditions in the hydrogenation or hydrodenitrogenation of nitrogen-containing heterocycles typical of coal liquids. The hydrogenation of model compounds, model compound mixtures and coal liquids will be carried out using the new class of catalysts, metallophthalocyanines [M(PC)]. The catalysts to be used are supported on silica [M(PC)]/SiO_2; where M = Mn, Fe, Co, Ni, Cu, Zn, Mg, Pb, Sn, Mo, Rh, Rd, Pt, Os, Ir. The reduced forms, M/sub n/^{1}[M(PC)]/SiO_2 where M^1 = Na or Li and n = 1 to 5, are to be prepared and their catalytic activity evaluated. The initial screening of the catalysts will be done using quinoline as a substrate at 300 to 400°C and pressure of 1000 to 3000 psi H_2. The most effective catalysts will then be selected and used in hydrogenation of other model compounds like pyridine, indole, carbazole and acridine, in the hydrogenation of model compound mixtures and then coal liquids. The model compound mixture to be used consists of phenanthrene, dibenzothiophene, dibutylsulphide, quinoline, dibenzofuran and p-cresol. Coal liquids from the H-Coal process will be subjected to hydrotreating. Results of hydrogenation of quinaline using supported tin (II) salts as catalysts are reported here.

9231 **(DOE/PC/50041—27) Wilsonville advanced coal liquefaction research and development facility, Wilsonville, Alabama. Topical report No. 7. Operation and maintenance, 1982.** (Catalytic, Inc., Wilsonville, AL (USA)). Dec 1983. Contract AC22-82PC50041. 51p. NTIS, PC A04/MF A01. Order Number DE84005467.

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An overall view of the 1982 plant operating performance is presented. All periods of ON-FEED operation, UNSCHEDULED SHUTDOWNS, and SCHEDULED SHUTDOWNS are accounted for and tabulated. Causes of UNSCHEDULED SHUTDOWNS are identified and discussed. Plant solutions aimed at reducing the effect of similar future shutdowns or preventing recurrence of such shutdowns are explained. Details of repeated, major maintenance problems with various pieces of equipment are presented. Discussion of each problem and solutions found during 1982 are given, where applicable.

9232 **(DOE/PC/50783—5) Heavy recycle solvent studies in two-stage coal liquefaction. Fifth technical progress report, June 11-September 10, 1983.** Longanbach, J.R. (Battelle Columbus Labs., OH (USA)). 30 Sep 1983. Contract FG22-82PC50783. 46p. NTIS, PC A03/MF A01. Order Number DE84000424.

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The results of elemental analyses, molecular weight measurements and H^1-NMR analyses are complete for each fraction separated from the -454 C and +454 C cuts of Lummus ITSL recycle solvent. Average structures have been drawn for each fraction based on analysis of the analytical data using the Brown-Ladner equations. Similar characterization has been done for the +454 C fraction, which can be precipitated in heptane (asphaltenes). The H^1-NMR clearly shows the presence of a hydrogen bonded hydroxyl proton. The amount of donatable hydrogen in each solvent fraction was estimated based on assignment of parts of the H^1-NMR spectra to hydrogen in hydroaromatic systems. The addition of more -454 C solvent improves the conversion to THF solubles and of preasphaltenes to asphaltenes. The addition of more +454 C solvent decreases the conversion of coal to THF solubles. Individual solvent fractions which, when added at solvent to coal ratio of 0.5:1.0, produce larger yields than no added solvent include -454 C aromatic hydrocarbons (+6.6%), +454 C N-aromatics (+4.6%), +454 C aliphatics (+3.1%), +454 C aromatic hydrocarbons (+2.4%), and -454 C aliphatics (+0.2%). N-containing aromatics are the most effective solvent fractions in converting coal to premium products as measured by the ratio of asphaltenes + oils/preasphaltenes. The polar solvent fractions adduct to the dissolving coal fractions more readily than the aromatic hydrocarbons. The aromatic hydrocarbons shuttle hydrogen better than the other solvent fractions based on the amount of hydrogen gas consumed.

9233 **(DOE/PC/60781—1) Novel catalytic methods for heteroatom removal in coal liquids upgrading. Quarterly report No. 1, September 1-December 1, 1983.** Laine, R.M.; Hirschon, A.S.; Wilson, R.B. Jr.; Sundback, K. (SRI International, Menlo Park, CA (USA)). Dec 1983. Contract FG22-83PC60781. 7p. NTIS, PC A02/MF A01. Order Number DE84004890.

We are presently conducting baseline studies designed to establish the reactions of the coal liquids with the strong nucleophiles in the absence of catalysts. We are also establishing baseline conditions for commercial (Harshaw) HDN catalysts based on method of catalyst activation (with and without sulfiding), quantity of catalyst added, and quantities of coal liquid used in our reactor configuration. SRC-II middle distillate was obtained from the Pittsburg and Midway Mining Company SRC pilot plant at Ft. Lewis, Washington. The cobalt-molybdenum catalyst, HT-400 (3 wt % CoO, 15.1 wt % MoO_3, on Al_2O_3) was obtained from Harshaw Chemical Company. Hydrogen sulfide (H_2S) was obtained from Matheson. Hydrogen (H_2), nitrogen (N_2), and an H_2S (10%)/H_2 gas mixture were obtained from Liquid Carbonic. Hydrogenation reactions have been performed in a 300-mL Autoclave Engineers (AE) Magnedrive stirred reactor, heated with a 1000-watt electric furnace (AE). The temperature was controlled with a model CP temperature controller (AE). The autoclave was connected through a sample gas vent to a Carle Series S gas chromatograph adapted by Carle to analyze C_1-C_3, H_2, O_2, N_2, and H_2S. For gas analyses, the autoclave was vented into the 1-mL sample injection port of the GC. Nuclear magnetic resonance spectra were obtained on a JOEL FX 90Q spectrometer.

9234 **(DOE/PC/60803—1) Thermodynamic behavior of coal liquids in the presence of coal solids characterization of IOM and ash. First quarterly progress report, August 1-November 1, 1983.** Holder, G.D.; Klara, S.M. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). Nov 1983. Contract FG22-83PC60803. 12p. NTIS, PC A02/MF A01. Order Number DE84004463.

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This program will characterize the role of coal-derived solids (ash and pyridine insoluble organic matter) in the equilibrium between liquid and adsorbed phases. The degree to which liquids are adsorbed on coal solids will be measured as a function of liquid properties including molecular weight, boiling point, specific gravity, and oxygen content. In preliminary experiments we found that adding 50 weight percent coal derived solids to a tetralin/phenol mixture at 227°C caused the vapor pressure to increase 25% (from 32 psia to 40 psia). It is thought that the solids are adsorbing the heavier component causing the liquid phase concentration of the more volatile component to rise. This would cause distillations to result in much sharper separations than would otherwise be predicted. This project will quantify the effects of coal solids on the vapor pressure of the coal liquids as a function of the temperature.

9235 **(MLM-MU—83-71-0003) History of the Exxon coal liquefaction pilot plant component performance.** DeWitt, R. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). Nov 1983. Contract AC04-76DP00053. 343p. NTIS, PC A15/MF A01. Order Number DE84005502.

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This report is a compilation of the critical component operating experience at the Exxon Coal Liquefaction Plant (ECLP) at Baytown, Texas. Monthly, quarterly, and annual technical progress reports, as well as topical reports and component meeting minutes were reviewed for performance information concerning pumps, valves, instruments and controls, materials and heaters and heat exchangers. The component information is presented as a synopsis which describes the component state of development, a performance summary and an operational history, which gives a chronological listing of significant component events. This report is intended to serve as a convenient locator of component information that has appeared in the various pilot plant reports, as well as, to serve as a fast overview of the history of component problems and solutions which have been experienced at the pilot plant.

9236 **(NP—4770098) Mathematical model of the heating of coke ovens.** Worberg, H.R. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 5 Jul 1982. 149p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770098.

The development of mathematical models for the partial processes of the heat conduction in the heating flue of coke ovens, namely the nonstationary heat conduction in the edger and header walls and the regenerative preheating of the combustion media, are described. It was found that the nonstationary behaviour of the heating flue of coke ovens is well reproduced by the mathematic model of the heating wall and the stationary regenerator model is well suited for the dimensioning of the installed capacity.

9237 **(PB—83-257790) Microstructural study of failure mechanisms during mechanical testing in coal gasification environments. Final report Mar 1980-Mar 1982.** Page, R.A. (Metal Properties Council, Inc., New York (USA)). May 1982. 97p. NTIS, PC A05/MF A01.

This report sets forth the results of a microstructural study of the behavior of iron-chrome-nickel alloys under the combined effects of stress and corrosive species encountered in coal gasification. The work involved systematic study of the effects of variations in alloy and environment compositions. Included are oxidizing and sulfidizing gas compositions. Model alloys were procured and heat treated. In addition, microstructural changes which occur in 310 stainless steel, Incoloy 800H, RA 333 and IN 657 during stress rupture testing in a simulated coal gasification environment at 1500 F were examined. Optical metallography and energy dispersive X-ray analysis were used to characterize the microstructure and mechanisms were proposed.

9238 **(PNL—4815) Chemical and biological effects of heavy distillate recycle in the SRC-II process.** Wilson, B.W.; Pelroy, R.A.; Anderson, R.P.; Freel, J. (Pacific Northwest Lab., Richland, WA (USA)). Dec 1983. Contract AC06-76RL01830;AC22-82PC50001. 54p. NTIS, PC A04/MF A01. Order Number DE84005070.

Recent work from the Merriam Laboratory continuous coal liquefaction units shows that heavy distillate from the SRC-II process can be recycled to extinction, and hence a distillate product boiling entirely below 310°C (590°F) (or other selected boiling points) is feasible. In these runs distillate yield was not reduced; gas make was unaffected; and hydrogen consumption was increased only slightly, in keeping with the generally higher hydrogen content of lighter end products. Total distillate yield (C_6-590°F) was 56 wt %, MAF coal in runs with subbituminous coal from the Amax Belle Ayr mine. Product endpoint is well below 371°C (700°F), the temperature above which coal distillates appear to become genotoxic; and the product was shown to be free of mutagenic activity in the Ames test. Chemical analyses showed both the < 270°C ($<$ 518°F) and the < 310°C ($<$ 590°F) distillates to be essentially devoid of several reference polycyclic compounds known to be carcinogenic in laboratory animals. Tests for tumorigenic or carcinogenic activity were not carried out on these materials. However, a comparison of chemical data from the Merriam heavy distillate samples with data on the other SRC-II distillates where carcinogenesis or tumorigenesis data is available leads to the expectation that < 371°C ($<$ 700°F) materials from the Merriam Laboratory will have greatly reduced tumorigenic and carcinogenic activity in skin painting tests. Other studies suggest the product should be more readily upgraded than full-range (C_6-900°F) distillate.

9239 **Coal-gas cleanup facility.** Rib, D.M.; Kimura, S.G.; Smith, D.P. (General Electric Corporate Research & Development, Schenectady, NY). *Environmental Progress;* **2**: No. 2, 86-91(May 1983).

The operation of a Process Development Unit-Scale Integrated Coal-Gasification Combined Cycle experimental facility is presented. The Benfield system is shown to adequately scrub sulfur compounds over a wide range of gas compositions and operation conditions. The particulate and alkali levels in the product gas are well within the acceptable range for existing gas-turbine fuel specifications. (JMT)

9240 **Bacteriological in situ gasification of peat to methane.** Hallberg, R.; Martinell, R. pp 312-319 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

To use peat as an energy resource has become more and more important. The traditional way has been to mine, dry and burn it. An alternative method to use the peat as an energy resource and which does not cause a big and ugly wound in the nature is the Vyrmethane method. The Vyrmethane method is an in situ gas production method, e.g., the gas production takes place directly in the ground and the groundwater is used as transport medium for the gas. It is a method where the peat bog remains after the exploiting. The method is a circulation process, where the methane gas produced by bacteria in the bog is dissolved in the water and the methane enriched water is then pumped up to a degassing station above the ground. The degassed water is then recirculated from the degassing station back into the bog. The methane gas is directly distributed from the degassing station for different use. The potential of energy possible to extract from a peat bog when using the Vyrmethane method is of the same order as mining the peat.

9241 **Mathematical modelling of an entrained coal gasifier.** Boysan, F.; Weber, R.; Swithenbank, J. (Univ. of Sheffield, England). pp 378-387 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A mathematical model of an entrained coal gasifier is presented. It is based on the solution of the momentum mass and energy equations in an Eulerian frame of reference and the equations of motion for solid particles in a Lagrangian frame. The model simulates stochastically the behavior of individual coal particles in turbulent reacting flow. If many particles are injected and an averaging procedure is applied then parameters of both the gas and the solid phase are obtained. The theoretical model is applied to a cyclone gasifier presented in literature in which subbituminous coal was gasified without steam addition. 9 references, 7 figures, 2 tables.

9242 **Use of modelling techniques in SNG process development.** Day, J.R.; Tait, A.R. pp 388-398 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Experimental and mathematical modelling methods have been employed by British Gas to support SNG process development. The uses of scale model investigations and theoretical techniques in aiding plant design, providing scale-up data and avoiding operating problems are exemplified by applications involving the Catalytic Rich Gas process, the Gas Recycle and Fluidized Bed Hydrogenators and the Slagging Gasifier. 21 references, 11 figures, 1 table.

9243 **Critical study of materials for synthetic gas quench systems.** Bhattacharyya, S.; Torok, J.; Hill, V.L. pp 400-411 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Corrosion in gas and liquid phases of selected gasification process quench systems was evaluated using autoclaves. Synthesis gas environments evaluated were: HYGAS, CONOCO COAL, BI-GAS, Synthane, Dry-Ash Lurgi, Slagging Lurgi, and Westinghouse. A group of 23 alloys was initially evaluated followed by tests of carbon steel and 304 SS. Weight-loss coupon and U-bend samples were used to determine general corrosion, pitting, and stress-corrosion cracking. The results indicated that unprotected carbon steel cannot be used in quench system environments, and stainless alloys are adequate against general corrosion and pitting. In HYGAS, Dry-Ash Lurgi, Slagging Lurgi, and Westinghouse, 304 SS experienced stress-corrosion cracking with more damage caused in the vapor phase and on sensitized material. 15 references, 5 figures, 4 tables.

9244 **Erosion-corrosion of structural materials in a simulated coal gasification environment.** Vesely, E.J. Jr. (IIT Research Inst., Chicago, IL); Howes, M.A.H.; Silence, W.L. pp 412-422 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Materials response in an erosion-corrosion environment typical of coal gasification components has been evaluated for the effects of temperature, pressure, and erodent impingement angle. The results of recent 100 to 200 h tests performed at 482° to 982°C (900° to 1800°F) indicate that surface loss rates at 482°C (900°F) due to erosion-corrosion are comparable in magnitude to those at 982°C (1800°F) at particle velocities of 15 m/s. Between 482°C (900°F) and 816°C (1500°F) increasing temperature causes decreasing material loss; however, between 816°C (1500°F) and 982°C (1800°F) increasing temperature causes increasing material loss. Erosion-corrosion losses are also sensitive to applied pressure over the range 0.1 to 6.9 MPa (0.3 to 1000 psig). Under some conditions, intermediate pressures can cause higher losses than 0.1 or 6.9 MPa (1000 psig) tests. Impingement angle tests at 816°C (1500°F) and 1.7 MPa (250 psi) suggest a classical brittle material response to the erosion-corrosion.

9245 **Materials performance at high temperatures and pressures in simulated coal gasification atmospheres.** Humphreys, B.A.; Hill, V.L.; Blough, J.L. pp 423-433 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The corrosion behavior of candidate alloys for use as coal gasifier internals was investigated in laboratory tests designed to evaluate the effect of operating pressure and H_2S concentration on the service life of high temperature alloys. Coupons of the alloys were exposed in a typical medium-Btu gas atmosphere for 10,000 h at two temperatures, 899° and 982°C, two pressure levels, 3.45 and 6.89 MPa, and two levels of H_2S, 0.5 and 1.0 volume percent. The ramaining constituents in the gas were constant for all six tests. At both temperatures, significantly increased corrosion occurred at the higher H_2S and pressure levels for many of the test alloys. Test results also indicated that for several alloys improved corrosion resistance resulted at both temperatures when the pressure was lowered from 6.89 to 3.45 MPa. 8 references, 4 figures, 3 tables.

9246 **Materials performance in coal gasification environments.** Verma, S.K. (IIT Research Inst., Chicago, IL). pp 434-444 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

To deal with the materials problems faced in the coal gasification environment, a multifaceted approach has been adopted at IIT Research Institute in which alloy-gas interaction, the pilot plant exposures, and erosion-corrosion tests have been carried out under funding from MPC, DOE, and GRI. This paper summarizes the results of analysis of the corrosion data and scales on selected alloys - predominantly, a ferritic (446), an austenitic (310), and a cobalt-base alloy (6B) - exposed to different conditions of coal gasification environment. Detailed analyses of the corrosion products and the compositional variation across the metal/scale interface have been compiled to correlate the amount of chromium in the alloy or at the alloy/scale interface with the corrosion rates. The role of sulfides present below the oxide scale in breaking the protective nature of Cr_2O_3 is also discussed. Minor elements present in the chromium oxide scale have been found to influence the corrosion rates, possibly by modifying the defect structure or the plasticity of the scales. 18 references, 6 figures, 5 tables.

9247 **Performance of test materials in Westinghouse PDU fluid bed gasifier.** Yurkewycz, R.; Firestone, R.F. (IIT Research Inst., Chicago, IL). pp 445-455 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

In recent years, a number of second-generation gasification processes have been proven on a pilot plant scale. The proper selection of corrosion-resistant materials (alloys, refractories) for the construction of large-scale gasifiers will aid in maximizing plant reliability by reducing equipment failure due to corrosion. This paper describes the results of a materials test exposure conducted in the Westinghouse 15 ton/day fluid-bed gasifier located in Madison, Pennsylvania, USA. A number of metal and refractory specimens were exposed for a cumulative time of 1100 h. From observations on twelve high-temperature alloys, the detrimental effect of high nickel content compared to chromium is discussed and qualitatively compared to a laboratory test simulating the anticipated commercial-scale gasifier. Similarly, the deteriorating effects of the gasifier environment on two phosphate-bonded refractories and silicon carbide are described. 10 references, 6 tables.

9248 **Properties and performance of candidate structural metals for the production of synthetic gas from coal.** Christ, B.; Ondik, H.; Perloff, A.; Beck, B. pp 456-470 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—). Contract AI20-82LC10967.

From International gas research conference; London, UK (13 Jun 1983).

Data from several nationwide (United States) Department-of-Energy-sponsored programs have been collected and evaluated by the DOE-sponsored Materials Performance Center at the US National Bureau of Standards. New and traditional alloys, about 60 of them, were evaluated. Laboratory measurements and in-plant measurements were made of the following properties: hot gas corrosion rates, aqueous corrosion rates, erosion-corrosion rates; and mechanical properties in a coal gasification environment. Highlights of these data will be discussed in light of design needs at critical plant locations. Furthermore, test methodologies and opportunities for standardization will be discussed. 18 references, 2 figures, 4 tables.

9249 **British Gas HICOM methanation process for SNG production.** Ensell, R.L.; Stroud, H.J.F. pp 472-481 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The British Gas HICOM process (formerly HCM) is an efficient and cost-effective means of making substitute natural gas (SNG) from gases derived from certain coal gasification processes. For example, with the British Gas/Lurgi Slagging Gasifier, coal-to-SNG thermal efficiencies of about 70% are possible. In this process a methane-rich gas is made directly from the purified gasifier product gas by reaction with steam over a British Gas catalyst with the temperature rise controlled by hot gas recycle and split-stream operation. The current HICOM configuration was developed from in-depth evaluation of full-scale plant designs. Pilot plants, that directly simulate full-scale reactors, have completed over 15,000 hours on stream with single tests of over 2000 hours and a good catalyst life has been achieved. A demonstration of the HICOM process is scheduled for 1984 in which 5300m³/h of gas from a British Gas/Lurgi Slagging Gasifier will be treated. 2 references, 6 figures, 3 tables.

9250 **Potential of novel methanation catalysts.** Isiakpere, S.E.; Kitchener, I.J.; Komodromos, C.; Lam, C.W.; Parkyns, N.D. (British Gas Corp., London, England). pp 482-492 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The use of catalytically active metal monoliths containing nickel and ruthenium for methanation is described. A novel method, temperature programmed methanation (TPM), has been used to compare catalytic activity of different preparations. An approximate model of the temperatures generated in an adiabatic reactor predicts that the temperature/distance profile is much sharper for pellets than for monoliths. It is suggested that this difference arises from the superior heat transfer properties of monoliths for transferring the enthalpy of reaction from the catalyst surface to the product gases. Methanation of CO-containing gases in a high pressure laboratory reactor confirms the predictions of the simple model about the temperature profiles. 15 references, 8 figures.

9251 **Methanation kinetics with transition element catalysts.** Happel, J.; Hnatow, M.A.; Bajars, L.; Otarod, M.; Lee, A.L. pp 493-500 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Transition-element oxysulfide catalysts, in addition to being completely insensitive to poisoning by sulfur compounds, catalyze the direct methanation reaction predominantly. They are thus especially well suited to process gases from the more recently developed coal gasifiers which employ less steam and produce synthesis gas of low H_2/CO ratios. Data obtained at IGT in bench-scale equipment operated for extended periods of time with a typical catalyst were correlated by rate equations for use in further process development. These kinetic equations have been employed to illustrate the effect of space velocity and syngas composition on the product gas. Operation with nickel catalysts would not be possible under these conditions because of deactivation by coke formation. Further substantial improvements in activity have been obtained with newer catalysts presently being developed. 5 references, 3 figures.

9252 **Methanation of CO rich gases at high pressures.** Becker, J.; Cheng, Y.H.; Hedden, K. (Univ. of Karlsruhe, Germany). pp 501-510 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The methanation of CO/H_2-mixtures over nickel catalysts has been examined extensively in the last few years, but not under the conditions of a technical process producing SNG. Using a special fixed bed reactor for kinetic experiments at pressures between 30 and 90 bar under isothermal conditions a substantial deactivation of the nickel catalysts occurs, which is accelerated with increasing CO-partial pressure. A mechanism for this, the growth of crystal size by nickel transport via nickel carbonyl inside the pores - has been detected. With catalysts which deactivate to a level of constant activity which is still high enough for technical application the kinetics of the methanation at high pressures were determined. From the dependence of the CH_4 - and CO_2 - selectively on residence time conclusions could be drawn as to the mechanism of the methanation. While these catalysts satisfy the demands of the technical process sulfur resistant catalysts are of only limited applicability because of their lower activity. 6 references, 6 figures.

9253 **Methane from synthesis gas.** Hoehlein, B. (Kernforschungsanlage Juelich GmbH, Germany). pp 511-520 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The methanation process is an important unit in generating synthetic natural gas (SNG) from coal and in providing heat in the Long-Distance Nuclear Energy Transport (NFE) system. Procedures for methanizing synthesis gases containing CO, CO_2 and H_2 have been developed and tested at the Kernforschungsanlage Juelich GmbH (KFA - Federal Republic of Germany) since 1976. This is being carried out together with our partner in the NFE Project, Rheinische Braunkohlenwerke AG, Cologne (FRG) and partly with Haldor Topsoe A/S in Copenhagen (Denmark). In 1982 a single-stage pilot plant was put into operation at the KFA in which one reactor with cooled stepped reaction tubes and catalytic fixed beds was utilized. The first test operation of 450 hours shows that at a high gas load on the reaction tubes, thermodynamic equilibrium with a high methane content in the product gas can almost be achieved after about 5 m of the reactor length with simultaneous steam production at 100 bar. 6 figures.

9254 **Mathematical modeling of electrolinking.** Tidball, R.K.; Krantz, W.B.; Gunn, R.D. pp 522-530 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—). Contract AS20-80LC10442.

From International gas research conference; London, UK (13 Jun 1983).

Prior to any gasification in the underground coal gasification (UCG) process, it is necessary to link or establish one or more relatively narrow high permeability channels between the injection and production well bores. Electrolinking achieves this permeability enhancement by carbonizing the coal via resistance heating between two electrodes placed in the well bores. This technique has been shown to be promising in commercial scale operations in the Soviet Union. However, field testing of this linking method in the US has indicated that it is unreliable and unpredictable. This paper devel-

ops a model based on linear stability theory which predicts the number, diameter, and propagation velocity of the electrolinks which form during the initial stages of electrolinking when the carbonization front is propagating radially about the electrodes. The model predictions are compared with limited data and then used to suggest possible improvement in this linking technique. 11 references, 2 figures, 1 table.

9255 **Aims and present state of the Belgo-German in situ gasification project.** Ledent, P.; Li, T.K.; Chandelle, V.; Fabry, R.; Kurth, M.; Sonntag, C. pp 539-550 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A Belgo-German trial project is being held in Belgium at Thulin, in a coal deposit at 860 metres depth. The aim of the trials is to create an underground gas generator which can operate at a pressure of 20 to 30 bars. A first experiment with reverse combustion - which was carried out in 1982, in order to link two boreholes 35 metres apart - had to be halted. A second experiment is currently under way, various improvements having been made to the equipment to eliminate the self-ignition of the coal in the vicinity of the injection hole to avoid scattering of the fires and to prevent the accumulation of water at the bottom of the gas recovery hole. 8 references, 9 figures, 1 table.

9256 **Research conducted in France into the underground gasification of coal.** Donat, G. pp 551-564 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

For 5 years France has been interested in utilising coal layers not exploitable with traditional mining methods especially deep coal layers (800 m and more). The process investigated involves the in situ gasification with oxygen which should allow the recovery of large quantities of coal from beneath France. The program of research from 1979 to 1984, corresponds to a budget of 155 million francs and includes theoretical studies, laboratory work and experiments on site. A first on-site feasibility field test was made during the period from March 1980 to July 1981 and BRUAY-en-ARTOIS (Nord). Results are presented. A new experiment is underway on another site, the HAUTE DEULE, near LENS (Pas-de-Calais) aiming at more ambitious objectives than in BRUAY-en-ARTOIS. Experiments have been made since 1981 at the ECHAUX (Loire) in a shallow coal layer. They have already allowed the linking of two wells, 10 m apart, by electrocarbonization. Despite these first partial successes, there are still important and numerous problems to be solved in order to turn underground coal gasification into an industrial operation. The energy which would be recovered if the work is successful, justifies these research efforts. 3 references, 7 figures.

9257 **Detailed local measurements in the BYU entrained coal gasifier.** Hedman, P.O.; Highsmith, J.R.; Soelberg, N.R.; Smoot, L.D. (Brigham Young Univ., Provo, UT). pp 27p, Paper 6 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

A laboratory-scale entrained-flow coal gasifier has been used to investigate the local details of an entrained coal gasification process. Results from a series of mapping tests are reported for an oxygen/coal ratio of 0.92 and a steam/coal ratio of 0.27 using a Utah high volatile, low sulfur bituminous coal. Detailed radial measurements of coal gasification products (CO, CO_2, H_2, CH_4, Ar, N_2, He and O_2) as well as sulfur pollutants (H_2S, SO_2, COS, and CS_2) and nitrogen pollutants (HCN, NH_3, and NO), from samples obtained with water-quenched sample probes, were measured at seven different axial stations down the 120 cm long reactor. Local carbon, sulfur, and nitrogen conversion from the coal to the gas phase have been determined from ash-carbon, ash-sulfur, and ash-nitrogen material balances respectively. These data have allowed the important reactions processes to be determined and provide insight into the chemical mechanisms of pollutant formation. The local data are also useful for comparison and validation of generalized entrained coal gasification models.

9258 **Application of optical and electron microscopy to coal conversion systems.** Harris, L.A. (Oak Ridge National Lab., TN). pp 373-381 of Process mineralogy II: applications in metallurgy, ceramics, and geology. Hagni, R.D. (ed.). Warrendale, PA; Metallurgical Society of American Institute of Mining, Metallurgical and Petroleum Engineers, Inc. (1982). Contract W-7405-ENG-26.

From AIME annual meeting; Dallas, Texas, USA (14 Feb 1982).

The formation of coke during coal liquefaction can eventually result in catastrophic failure of the conversion system. Coking typically proceeds by the formation of liquid crystals (mesophase) and the subsequent separation of these crystals from the plastic phase formed during heating of coal. The anisotropy of the mesophase makes it readily detectable in the optical microscope under polarized light. This study examines the solids formed during coal liquefaction processing by optical and electron microscopy. Obaervations on the relationships between the coke morphology, minerals, and inert macerals are presented.

9259 **Coal liquefaction model studies: free radical chain decomposition of diphenylpropane, dibenzyl ether, and phenyl ether via β-scission reactions.** Gilbert, K.E.; Gajewski, J.J. (Indiana Univ., Bloomington). *Journal of Organic Chemistry;* 47: No. 25, 4899-4902(1982). Contract AC02-80ER10721.

The thermal decompositions of 1,3-diphenylpropane (1), dibenzyl ether (2), and phenethyl phenyl ether (3) have been found to proceed by free radical chain processes. 1 gave toluene and styrene with a reaction order of 1.55, E/sub A/ = 51.4 kcal/mol, and log A = 12.5. The reaction could be initiated by benzyl phenyl ether but not by 1,2-diphenylethane. 2 gave toluene and benzaldehyde with a reaction order of 1.43, E/sub A/ = 48 kcal/mol, and log A = 12.6. The reaction could be initiated with benzyl phenyl ether. 3 gave phenol and styrene with a reaction order of 1.21, E/sub A/ = 50.3 kcal/mol, and log A = 12.3. The reaction could be initiated by benzyl phenyl ether. All of the data are consistent with free radical chain processes with the reaction order determined by the termination reaction. No evidence for concerted reactions has been found. The thermal chemistry of three-atom links is best described by free radical chain processes. The products are consistent with a free radical chain process involving a β-scission reaction, and the reaction orders range between first and three-halves order depending upon the nature of the chain termination reaction. Activation parameters are readily estimated from thermochemical kinetic data on the individual reactions with log A $\simeq$ 12 and E/sub A/$\simeq$ 50 kcal/mol. Unlike the one- and two-atom linkages, reactions of the three-atom linkages are promoted by free radical initiators. The potential for inhibition of free radical chains also exists and is currently being studied. 4 tables.

0106 Properties

REFER ALSO TO CITATION(S) 9228, 9234, 9297, 9299, 9324

9260 **(DOE/MC/19314—1457) Differential optical absorption techniques for diagnostics of coal gasification. Technical progress report, October, November, December 1982.** (Mississippi State Univ., Mississippi State (USA). MHD Energy Center). Apr 1983. Contract AC21-82MC19314. 29p. NTIS, PC A03/MF A01. Order Number DE83016072.

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The application of differential optical absorption (DOA) techniques for the in-situ determination of the chemical composition of coal gasification process streams is investigated. Absorption spectra of relevant molecular species and the temperature and pressure effects on DOA-determined spectral characteristics of these species will be determined and cataloged. A system will be configured, assembled, and tested.

9261 **(DOE/PC/30013—11) Data base for the analysis of compositional characteristics of coal seams and macerals. Technical progress report, August 1982-January 1983.** Davis, A.; Suhr, N.H.; Spackman, W.; Painter, P.C.; Walker, P.L.; Given, P.H. (Pennsylvania State Univ., University Park (USA). Coal Research Section). Jan 1984. Contract AC22-80PC30013. 59p. NTIS, PC A03/MF A01. Order Number DE84005293.

The basic objectives of this program are, first, to understand the systematic relationships between the properties of coals, and second, to determine the nature of the lateral and vertical variability in the properties of a single seam. A total of seventy samples were collected from the Rocky Mountain and Northern Great Plains provinces. Five hundred and five data printouts and 156 coal samples were provided on request to other agencies involved in coal research. Analysis of variance studies were performed on a set of seam subsamples from 84 localities using inorganic components as variables. Results of tests for variability between localities and between levels in seams are presented. For the majority of inorganic variables considered, levels of variables are different between localities but not between subsample levels within seams. Frequency distribution histograms for ash-basis variables of the previously reported whole-seam data set are presented. The surface areas of coals measured from CO_2 and water adsorption isotherms at 298 K are reported. Water surface areas, which decrease with increasing rank, are much less than CO_2 areas except in the case of low-rank coals. Swelling of coals, varying in rank from lignite to anthracite, in water has been studied by comparing the solvent sorption measured by pycnometric and gravimetric methods. Swelling increases with decreasing rank. Low-rank coals show considerable swelling in water. 21 references, 28 figures, 21 tables.

9262 **(DOE/PC/50809—T4) Determination of the surface reactivity of coal powders. Fifth quarterly report, September 1, 1983-November 30, 1983.** Fowkes, F.M.; Jones, K.L.; Wolfe, J.E. (Lehigh Univ., Bethlehem, PA (USA). Dept. of Chemistry). 2 Jan 1984. Contract FG22-82PC50809. 4p. NTIS, PC A02/MF A01. Order Number DE84004915.

The purpose of this study is to determine the surface concentrations and strength of acidic and basic sites on the surface of powdered coal using flow microcalorimetry and to use this basic data to learn to interpret the distribution of zeta-potentials of these same powders in organic acid or basic media. During this quarter investigations were made on: (1) surface area measurments of powdered coal using nitrogen and carbon dioxide adsorption; (2) calorimetry of interaction of powdered coal in sio-octane solutions of pyridine; and (3) electrophoretic study of powdered coal in acetonitrile. 3 tables.

9263 **(NZERDC—97) Coal analysis in New Zealand.** Gray, V.R. (New Zealand Energy Research and Development Committee, Auckland). Sep 1983. 78p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE84900600.

Coal analysis methods and facilities in New Zealand are barely adequate for the present small scale industry, but will require improvement to supply the quality control and specification which are going to be needed to support an expanded and modernized coal industry. A set of national standards for coal analysis and testing needs to be reestablished and laboratories should be upgraded to be able to seek registration with the New Zealand Testing and Laboratory Registration Council (TELARC). The bulk of the report consists of a detailed survey of the various standard test methods, to provide a basis for a fresh set of New Zealand Standards for the analysis and testing of coal. New Zealand Laboratories equipped for analysis and testing of coal are listed. 18 references, 3 figures, 5 tables.

9264 **(TVA/OP/EDT—84/5) Laboratory and field acceptance performance of CONAC.** Humphris, D.A.; Lynch, R.W.; Tassicker, O.J.; Epstein, M.; Brown, D.R.; Gozani, T. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology; Electric Power Research Inst., Palo Alto, CA (USA); Bechtel Group, Inc., San Francisco, CA (USA); Science Applications, Inc., La Jolla, CA (USA)). 1983. 27p. (CONF-8311129—2). NTIS, PC A03/MF A01. Order Number DE84900619.

From EPRI seminar on applications of continuous coal analysis to the elelctric power utility industry; Nashville, TN, USA (8 Nov 1983).

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The Electric Power Research Institute (EPRI) and the Tennessee Valley Authority (TVA) are sponsoring a program for the development of the CONAC (Continuous On-Line Nuclear Analysis of Coal) instrument, with Science Applications, Inc. (SAI) as the prime contractor. EPRI and TVA are jointly sponsoring a field demonstration of CONAC at TVA's Paradise Steam Plant in Kentucky. The field demonstration began in October 1983. Prior to the field demonstration tests, the CONAC instrument underwent a 1-month acceptance test program at SAI's Sunnyvale laboratory, and a similar acceptance test program has been conducted during the first phase of the field demonstration at Paradise. The field and laboratory acceptance test programs have demonstrated that the CONAC determinations for carbon, hydrogen, sulfur, nitrogen, ash, moisture, chlorine, and heat content fall within acceptable prescribed limits of accuracy and precision. The test program has further demonstrated that the short-termed mechanical and electronic performance of CONAC under dynamic operation is acceptable, and that the radiation emitted from the CONAC system is well below acceptable prescribed safety limits. 8 figures, 7 tables.

0108 Waste Management

REFER ALSO TO CITATION(S) 9306, 9992

9265 (CONF-821215—, pp 45-53) **Argonne high sulfur dry scrubber.** Farber, P.S. (Argonne National Lab., IL). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Argonne National Laboratory has installed a pollution control system on a coal-fired boiler which will allow the use of high-sulfur midwestern coal. The dry scrubbing system, a lime-based spray dryer fabric filter, appears to be an economical and efficient control technique. 2 references, 3 figures, 6 tables. (JMT)

9266 **(KHM-TR—56) Emissions from coal combustion and fuel oil combustion.** Bergstroem, J. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Apr 1983. 179p. (In Swedish). NTIS (US Sales Only), PC A09/MF AA01. Order Number DE83751395.

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Emission measurements have been carried out at oil-fired boilers and different types of coal-fired plants. The measurements cover three oil-fired boilers of different sizes. At one of these boilers, test have also been carried out with the combustion of coal-oil mixtures. Measurements are described from two condensing power stations for pulverized coal with electrostatic precipitators and flue gas desulphurisation for part of the flue gases. The report describes measurements at two Wander grate-fired steam boilers and a small grate-fired hot water boiler. Fflue gas cleaning in these was by means of dynamic dust collectors. One of the boilers was also equipped with a bag filter during the measurements. A spreader stoker fireed steam boiler has been tested. This was only equipped with an older type of dynamic dust collector for flue gas cleaning. Finally, the report describes measurements at three fluidized bed boilers. Two of these were bubbling fluidized beds with bag house filters for flue gas cleaning, while the third was a cirkulating fluidized bed with an elektrostatic precipitator for flue gas cleaning. The sampling and anlyses were carried out simultaneously on all the flows and parameters which are considered important in order to define the effect of the plant on the environment. The report describes analyses of coal and oil which have been combusted during

the test periods. The results show emission data for the different plants and operating periods. In addition, determinations have been done of the distribution of ash, trace elements sulphur and halogens in the various flow paths in the plants. Since the boilers are of very different size the specific emission values are related to the energy supplied by the fule.

9267 **(KHM-TR—103) Bearing value and settlement of fly ash depositions from pressure metering and cone penetration tests.** Ottosson, E.; Moeller, B. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 35p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751392.

In this investigation pressuremeter- and cone penetration tests (CPT) have been carried out in the following four different types of fly ash fills. 1. conditioned ash filled on ground. 2. lagoon ash refilled on ground. 3. conditioned ash dumped into water. 4. lagoon ash after dewatering. The aim of this investigation has been to study the applicability of these methods for determination of the bearing capacity and settlements in structural fills of fly ash. The results from pressuremeter- and cone penetration tests have been used to calculate baering capacity and settlements according to existing methods for cohesionless natural soils. A comparative study with load tests carried out by the Danish Geotechnical Institute has also been performed. Pressuremeter tests have successfully been carried out in all four fill types and cone penetration tests in all fills except for the one with good puzzolanic activity (Fill No 1). The comparisons of calculated and measured settlements and bearing capacities indicate that pressuremeter test results can be used for these purposes. The settlement calculations from cone penetration test results also gave reasonable results but the calculation for bearing capacity was poor. This means that existing calculation methods for foundation design in natural soils probably can be used for fly ash fills, except for the bearing capacity calculations based on CPT-tests.

9268 **(KHM-TR—107) Demand for lime and other raw materials in fluegas cleaning.** Andersson, M. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 35p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751394.

Raw material for flue gas desulfurization is primarily lime (CaO). Control of NO/sub x/ emission by stack gas treatment uses ammonia (NH_3). Other raw materials are process water and ener gy. In denitrification processes catalysts may be used. In Sweden it seems as if dry (wet/dry) processes will be the normal FGD process used. In this process lime (CaO) is used as absorbent. The Swedish lime production capacity today is much higher than the demand due to low steel production and building activity. The demand of lime for FGD can easily be met. Mining, burning and transportation of lime are of minor importance compared with the emission and energy requirements when burning corresponding amounts of coal. Control of NO_3 emission by flue gas treatment in the larger coal burning plants will increase the demand of ammonia in Sweden a few per cent. This report has not identified any problems either in raw material supply to FGD/NOsub (x) control processes or regarding environmental impacts of importance.

9269 **(TVA/OP/EDT—84/7) Evaluation of sodium thiosulfate additive on the performance of a spray tower (train 100) scrubber system using limestone slurry, May 5, 1982-August 17, 1982. Final report.** Barkley, J.B.; Garrison, F.C.; Newton, S.F.; Patterson, J.G.; Runyan, R.A.; Wells, W.L. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology). 23 Nov 1983. 268p. NTIS, PC A12/MF A01. Order Number DE84900616.

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A 10 MW test using a limestone system with thiosulfate additive, was funded by the TVA Office of Power and was conducted at the Shawnee Test Facility between May 5 and August 17, 1982 on train 100 (spray tower). The primary purpose of the test was to evaluate the effect of sodium thiosulfate additive on spray tower system performance under typical commercial scrubbing conditions. A secondary test purpose was to obtain engineering data on scrubber system components under test conditions that would permit the comparison of actual performance with design performance. For specific test conditions (pH = 5.8, liquid-to-gas (L/G) ratio = 65 gal/1000 acf flue gas), SO_2 removal was unaffected by thiosulfate ion concentration, and the effective slurry liquor thiosulfate ion concentration for scale-free scrubbing was approximately 100 ppM. Another important finding was the increase of up to 20% in solids content of horizontal belt filter cake at a thiosulfate ion concentration in the slurry liquid of 600 ppM compared with belt filter cake solids when no thiosulfate ion was in the slurry liquid. Overall mass transfer coefficients (K/sub g/a for SO_2 absorption into limestone slurry ranged from 9.8 to 10.4 lb moles/hr ft^3 ATM. Comparisons of test K/sub g/a values with previously published values suggest that the gas film component was of predominant importance during all tests. Capital investment costs for the limestone-sodium thiosulfate scrubber system at 500 MW are approximately 6% lower than for a comparable limestone forced-oxidation system. The operating costs for a 500 MW limestone-sodium thiosulfate scrubber system are 5% lower than for a limestone forced-oxidation system of comparable size.

9270 **Flue gas desulfurization.** Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). 432p. (CONF-810308—Vol.5).

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

At present, flue gas desulfurization (FGD) is the only commercially significant technology for the abatement of sulfur dioxide from fossil-fueled power plants. In the book, five chapters report on the initial results of a US Department of Energy project to study the chemistry of flue gas desulfurization. Eight chapters deal specifically with rate processes and innovations in throwaway slurry scrubbing, and two chapters present results related to dry scrubbing with nahcolite or lime. Each of the 18 chapters have been separately abstracted and indexed for the U.S. Department of Energy's Energy Data Base. (JMT)

9271 **Thermodynamic values for desulfurization processes.** Brewer, L. (Lawrence Berkeley Lab., CA). pp 1-39 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract W-7405-ENG-48.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

The thermodynamic properties of gases, liquids, solids and aqueous solutes of interest for desulfurization processes are tabulated for temperatures from 298 degrees K to temperatures as high as 1000 degrees K when possible. Major emphasis has been placed on aqueous lime or limestone scrubbing, but the data can also be used for high temperature gas processes and for NO/sub x/ processes.

9272 **Reliable data for flue gas desulfurization processes.** Staples, B.R. (National Bureau of Standards, Washington, DC). pp 41-56 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract AI21-79MC11593.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

A wide variety of physical chemical data and vapor liquid equilibria are required to predict and to extrapolate performance reliability of flue gas desulfurization processes. A chemical and physical model capable of predicting actual scrubber performance is a continuing goal, but any model is only as reliable as the input data. Carefully evaluated thermodynamic and kinetic data are needed to insure consistency, accuracy, and to provide a basis for comparing processes or models. The methodology for the critical evaluation of thermodynamic properties of electrolytes is discussed in general, with emphasis on processes important in flue gas washing systems. How to use the present evaluation systems to provide updated data for flue gas washing processes is also discussed. A number of these specific processes were chosen to illustrate the evaluation procedure. Guidelines are provided for calculating and equilibrium constant, activity coefficient, Gibbs energy and enthalpy of reaction,

enthalpy of dilution, and standard enthalpy, Gibbs energy, entropy, and heat capacity. Sources of data and how to use them are discussed.

9273 **Use of Pitzer's equations to estimate strong-electrolyte activity coefficients in aqueous flue gas desulfurization processes.** Rosenblatt, G.M. (Los Alamos National Lab., NM). pp 57-73 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract W-7405-ENG-48.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

The computer code which is in current widespread use for analyzing the chemistry taking place in aqueous flue-gas-desulfurization (FGD) processes is based upon modified Debye-Hueckel single-ion activity coefficients and specific associations betwen oppositely charged ions. Recently, Pitzer and coworkers have presented equations for electrolyte activity coefficients in aqueous solutions which differ significantly in form and parameters, and also in predictions for model mixtures pertinent to FGD. The Pitzer equations have been shown to reproduce the behavior of complex, concentrated aqueous mixtures under a wide variety of conditions. In Pitzer's approach, both single- and mean-ion activity coefficients are calculated by summing over all interactions in the solution without involving specific associations, all interactions being described by the activity coefficients. Because they are a convergent series, the equations can be used at various levels of complexity and acuracy. When experimental data are unavailable, they can be truncated so that they contain only a few parameters. Those few parameters can be estimated empirically. Under these conditions, activity coefficients are estimated to an accuracy which will typically be better than 25%. It is concluded that Pitzer's equations offer a promising approach for thermodynamic modeling of FGD chemistry.

9274 **Thermal decomposition of sulfite, bisulfite, and disulfite solutions.** Meyer, B. (Univ. of Washington, Seattle); Rigson, M.; Burner, T.; Ospina, M.; Ward, K.; Koshlap, K. pp 113-125 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract W-7405-ENG-48.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

This work shows that oxygen-free sulfite in lime/limestone slurries, exposed to sulfur dioxide, slowly decomposes under process conditions. In fact, auto-redox reactions of sulfur oxyacids can occur in all coal desulfurization systems, including coal-gasification systems and impurities present in commercial flue gas systems are capable of catalyzing the reaction under process conditions. Our experiments indicate that any large-scale coal utilization will depend on appropriate control of the auto-redox reactions of sulfur species.

9275 **Kinetics of reactions in a wet flue gas simultaneous desulfurization and denitrification system.** Chang, S.G.; Littlejohn, D.; Lin, N.H. (Lawrence Berkeley Lab., CA). pp 127-152 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract W-7405-ENG-48.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

A number of processes currently undergoing development for simultaneous removal of SO_2 and NO/sub x/ have been based on either the oxidation of relatively insoluble NO to more soluble ferrous-chelating compound as a catalyst to aid in the absorption of the insoluble NO. These ferrous compounds have the ability to form complexes with the NO and thus promote the absorption of the NO. Once in solution NO/sub x/ can be reduced by the absorbed SO_2 to form molecular N_2, N_2O, or reduced nitrogen compounds such as $NOH(SO_3)$ $NH_2SO_3^-$, and NH_4^+; while SO_2 is oxidized to sulfate. The kinetics and mechanisms of reactions involved in this system are discussed.

9276 **Kinetics of the oxidation of bisulfite ion by oxygen.** Braga, T.G.; Connick, R.E. (Lawrence Berkeley Laboratory, CA). pp 153-171 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5). Contract W-7405-ENG-48.

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

The chain reaction between sulfur (IV) and oxygen has been studied in the pH region of 3.0 and 4.7 where bisulfite ion, HSO_3^-, is the principal species. Preliminary measurements were made with a two-phase gas-aqueous system. To avoid mass-transfer problems, the remaining studies were done on a single aqueous phase with no gas phase present and using an oxygen meter to follow the concentration of dissolved oxygen as a function of time. Empirical rate laws were determined for a variety of conditions, including the presense of ethanol, manganous ion and ultra violet light. Without additives the chain appears to be terminated by a bimolecular reaction of chain carriers, since the rate law contains powers of multiples of 1/2. Ethanol inhibits the reaction by chain termination involving a single chain carrier. Manganous ion is a strong catalyst, apparently through the introduction of a new propagating path as well as participation in the initiation. Ultra violet light presumably initiates the chain. The "simplest" resolution of the rate laws into the three components: initiation, propagation and termination is suggested. The data do not establish the identity of the intermediaties; other information will by necessary to fix mechanisms of the reation.

9277 **Control of SO_2 emissions by dry sorbent injection.** Yeh, J.T.; Demski, R.J.; Joubert, J.I. (Pittsburgh Energy Tech. Center, PA). pp 349-368 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5).

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

The use of dry alkali sorbents (sodium bicarbonate, trona, and nahcolite) to control SO_2 emissions from coal-fired boilers was studied while burning coals containing 1 to 3 percent sulfur. The tests were carried out in an experimental furnace designed to burn 500 lb/hr of pulverized coal. The sorbents were injected into the furnace flue gas as a dry powder, upstream of a baghouse filter. Operating variables considered included baghouse temperature and cleaning cycle time, sorbent particle size, sorbent/sulfur ratio, location of sorbent injection point, and sorbent injection schedule (continuous or intermittent). With the exception of baghouse cleaning cycle rate, each parameter had a significant effect on SO_2 removal efficiency. Up to 95 percent SO_2 removal could be obtained with each sorbent, with the proper selection of operating conditions.

9278 **Characterization of volatile organic components of Nahcoltie and Trona.** Farnum, B.W.; Timpe, R.C.; Farnum, S.A. (Grand Forks Energy Tech. Center, ND). pp 369-379 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5).

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

Nahcolite and Trona were heated at 250-650 degrees, yielding 1.3 and 0.2% volatile organic compounds. Proton and carbon-13 NMR and capillary gas chromatography indicated homologous series of n-alkanes and l-alkanes from C_9 to C_{29}. The samples resembled shale oil.

9279 **Conceptual design and economics of an improved magnesium oxide flue gas desulfurization.** Burnett, T.A.; Wells, W.L. (Tennessee Valley Authority, Chattanooga). pp 381-411 of Flue gas desulfurization. Hudson, J.L.; Rochelle, G.T. (eds.). Washington, DC; American Chemical Society (1982). (CONF-810308—Vol.5).

From American Chemical Society symposium on the chemistry of engine combustion deposits; Atlanta, GA, USA (29 Mar 1981).

An improved magnesium oxide (MgO) flue gas desulfurization process and its comparative economics are described. Innovations made include the use of a spray dryer, a cyclic hotwater reheater, and a coal-fired fluidized-bed reactor for regeneration of the MgO absorbent. Several technical concerns with the proposed design are addressed, including fly ash and chloride buildup. The economic evaluation shows the process to have a capital investment of about seven percent less than that of a conventional MgO scrubbing process and a 40 percent smaller annual revenue requirement. Finally, a sensitivity analysis is shown relating annual revenue requirements to the byproduct sulfuric acid price credit.

0109 Environmental Aspects

REFER ALSO TO CITATION(S) 9257, 9308, 9316, 9765, 9988, 10723, 10933

9280 (CONF-831203—91) Acid rain research: a review and analysis of methodology. Irving, P.M. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE84005217.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The acidic deposition phenomena, when implicated as a factor potentially responsible for crop and forest yield losses and destruction of aquatic life, has gained increasing attention. The widespread fear that acid rain is having or may have devastating effects has prompted international debates and legislative proposals. An analysis of research on the effects of acid rain, however, reveals serious questions concerning the applicability and validity of conclusions of much of the work and thus conclusive estimations of impacts are lacking. In order to establish cause-effect relationships between rain acidity and the response of a receptor, controlled studies are necessary to verify observations in the field since there are many natural processes that produce and consume acidity and because numerous other environmental variables affect ecosystem response. Only when the response of an entire system is understood (i.e., interactions between plant, soil, soil microbes, and groundwater) can economic impacts be assessed and tolerance thresholds established for the wet deposition of acids. 14 references, 5 figures, 1 table.

9281 (CONF-831244—1) Short- and long-term leaching of solid wastes from the H-coal coal liquefaction process. Francis, C.W.; Maskarinec, M.P. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 13p. NTIS, PC A02/MF A01. Order Number DE84004581.

From 2. conference on municipal, hazardous and coal wastes management; Miami Beach, FL, USA (5 Dec 1983).

Leaching tests were conducted on a variety of solid residues generated in the liquefaction, gasification, and wastewater treatment steps of the H-Coal coal liquefaction process. Leaching consisted of a short-term regulatory extraction test (EP toxicity test used to classify wastes under the Resource Conservation and Recovery Act-RCRA) and long-term (greater than 65 d) continuous-flow column studies to assess potential contamination of ground and surface waters as a result of land disposal of these wastes. The short-term test indicated that none of the wastes would be considered hazardous by the toxicity criteria of RCRA. Long-term leaching studies revealed that peak concentrations of potentially toxic inorganic constituents were generally below concentration limits of the primary and secondary drinking water standards and became 2 to 10 times lower on leaching to liquid/waste ratios greater than 5. Rainfall runoff from vacuum bottoms flaked residue monitored over an 8-month period was neutral to alkaline in pH, contained very low concentrations of inorganic constituents, and showed no indication of the chemical characteristics common in runoff from storage piles of high sulfur coals. Leachates from the solid residues, other than those from the filter cake (which contained detectable quantities of PAHs and other complex organic compounds, some of which are known to be toxic) appeared not to be a major environmental concern relative to potential contamination of ground or surface waters on disposal of these wastes in properly designed landfills. 12 references, 6 tables.

9282 (KHM-TR—52) Long-term study of a 240 MW coal powder fueled heat electric station. Ahling, B.; Lunden, L. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 160p. (In Swedish). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83751384.

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A long-term study of the emissions from a pulverized coal firing plant was made in order to evaluate the operation of the incinerator. The investigation included continuous registration of the following parameters during a period of four months and a statistical analysis of the resulting data. CO_2 - particles; CO - flue gas flow; SO_2 - flue gas temperature; NO - boiler load. The investigations showed that variations among all of the parameters measured were very small and variations in the operation of the boiler were likewise small. For 99 % of the time, the CO content of the flue gases was < 20 ppm and on only one occasion was a value exceeding 1000 ppm recorded. The few occasions on which increased CO emissions occurred can be correlated with changes of the fuel from coal to oil. The CO concentrations exceeded 100 ppm on only 6 to 7 occasions with a time of duration which corresponds to a frequency of 0.11 %. On changing from coal to oil, an increase in the emission of SO_2 and a decrease in that of NO was noted: this may be correlated with the higher sulphur and lower nitrogen content of oil compared with coal. In this report, comparison has been made with other similar investigations. The report concludes that the pulverized coal furnaces at Espoo show only small variations in the operating conditions which would be expected to influence the emissions.

9283 (KHM-TR—59) Effects on soil and plants from trace elements in fly ash from coal-fired plants for energy production. A literature study. Andersson, A. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 41p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751396.

The major components of the fly ash, i.e. Si, Al, Ca, Fe, Na, K, Mg, and Ti are harmless since they are the same as in the soil minerals. The problem is the high concentrations of some trace elements. As far as is known, some of these are nonessential and toxic, e.g. Cd, Pb, Hg and Tl, while others, like Zn, Cu, B, Se and Mo are essential and in some cases are micronutrients, which will become toxic if the levels are too high. Fly ash may also have fairly high concentrations of Ba and Sr, and Sr in particular is considered as the best indicator element when the impact of fly ash deposition is to be evaluated. The regional contributions from emissions of fly ash and trace elements from modern coal fired units are relatively samll as compared to other sources. A future consumption of 10 million tons of coal in Sweden can be expected to increase the present fallout of several investigated trace element by approximately one per cent or less, except for Hg, where the increase may be as much as 10 per cent. Locally, there may be larger contributions also for other elements.

9284 (KHM-TR—94) Environmental risks of oil and coal transport at sea. A comparative study. Linden, O.; Hallgren Larsson, E.; Westling, O. . (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 38p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751391.

The purpose of this study is to compare environmental impacts of transports by sea of oil and coal to Swedish harbours. The purpose is also to assess possible changes of risks following future changes in transported volumes of oil and coal. Considerable traffic with tankers to several Swedish harbours provides for the Swedish oil supply. A forecast concerning the future use of coal states that the import of coal will be 2.1 million tons in 1985, 4.8 million tons in 1990 and 10.0 million tons in the year of 2000. Future transports of coal are supposedly destinated to both the west and the east coast of Sweden and also to Lake Vaenern and Lake Maelaren. Since Swedish coasts have been spared from large oil spills, their environmental impacts will be discussed in forms of scenarios. Environmental impacts of hypothetic accidents with large oil spills will be compared with hypothetic accidents with large discharges of coal. The scenarios deal with accidents in the Baltic Sea and Lake Maelaren. Even though the consequences of serious accidents

are hard to estimate it can be stated that the environmental impacts of large oil spills are much more serious than the environmental impacts of large discharges of coal. Discharges of coal in marine environment and inland waters will presumably lead to small and local environmental impacts. High costs for clean-up operations, which is the case with some oil spills, will probably not occur with coal.

9285 **(KHM-TR—106) Operation disturbances affecting the emission. Frequency-Duration-Level.** Asplund, F.; Bergstroem, J.; Eriksson, K. . (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). 1983. 56p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751393.

In this report we have evaluated operating journals and data from long time measurements on dust emissions at two power stations, Vaesteraas for pulverized coal and Vaertan for oilfiring. The purpose was to see how often operation disturbances occur, duration and how they affect the emissions. As a comparison, data from KHM's long time measurements on coal-fired plants in Finland are also presented. Those measurements also include CO, NOsub (x) and SO_2. Data are presented for the operation disturbances. As the measurements at Vaesteraas powerstation show, operation disturbances can result in overall lower dust emissions. By an operation disturbance the coal-firing is partly or entirely replaced with oil-firing. The dust emission become lower than just for coal-firing. When the oil-firing is ended the dust emission gradually increases to the coal-firing level during a few days. The CO-concentrations increases when disturbances in the fuel-feed and combustion occur. The short time measurements of KHM show that the organic emissions increase with expanded CO-concentration in the flue gases. For concentrations above 700-800 ppm CO, the concentration of organic emission incraese faster than the CO-concentration. In a small on-off-regulated gratefired plant, approximately 20 samples have been collected in the flue-gas during different CO-concentrations. The samples were analysed for organic compounds within the inverval C_6 - C_{18}. There is only a slight relation between the total sum of the organic compounds and the CO-concentration. For the individual organic compounds there is a strong relation, especially for naphtalen.

9286 **(PB—83-258715) Illinois land report: Rice Lake Conservation Area. Volume 1. Final document.** (Illinois Dept. of Energy and Natural Resources, Springfield (USA)). 29 Aug 1983. 628p. NTIS, PC A99/MF A01.

This report was authorized by the Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA 81-1015). It was prepared in response to a petition from a citizen's organization (Save Rice Lake Area Association) which requested that the Rice Lake Conservation Area, owned by the Illinois Department of Conservation, be declared unsuitable for surface coal mining. This declaration of suitability or unsuitability will ultimately be made by the Illinois Department of Mines and Minerals. In addition, the report discusses the impact of mining on state and local land use plans, fragile and historic lands, renewable resource lands and natural hazard lands.

9287 **Composition and toxicity of solid waste leachates from industrial coal gasiifiers.** Cushman, R.M.; Brown, D.K. (Oak Ridge National Lab., TN). pp 491-492 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—). Contract W-7405-ENG-26.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

9288 **Acid rain: the need to speak out.** McAvoy, J.F. (Bureau of Mines, Washington, DC). pp vp, Set No. 5, Paper 2 of 1982 Coal convention session papers. St. Louis, MO; American Mining Congress (1982). (CONF-8205192—).

From American Mining Congress coal conference; St. Louis, MO, USA (9 May 1982).

Environmental issues, namely acid precipitation, and ways of solving these problems are discussed. The scientific uncertainties associated with controlling acid rainfall and more effective means of controlling the effects of acidic rainfall than by massive sulfur dioxide or nitrogen dioxide reduction programs are presented. The US actions taken to reduce air pollution, such as the Clean Air Act, are discussed. Research programs to address key areas of uncertainty and workgroups with Canada with scientific, technical and legal specialists are reviewed. Attention is given to the cost of control programs and to future legislation. (BLM)

0110 Reserves And Exploration

REFER ALSO TO CITATION(S) 9261, 9313, 9380

9289 **(DOE/FE/05113—T1) Louisiana peat resources. Final technical report, 1 April 1981-15 April 1983.** Kosters, E.C.; Bailey, A. (Louisiana Geological Survey, Baton Rouge (USA); University of Southwestern Louisiana, Lafayette (USA). Dept. of Geology). Aug 1983. Contract FG18-81FE05113. 67p. NTIS, PC A04/MF A01. Order Number DE84005282.

Five peat prospect areas - Gueydan, Avery Island, Sale-Cypremort, Barataria, and Lake Pontchartrain - are representative of different types of South Louisiana peat deposits. Together, the prospects are estimated to contain about 20 x 10^6 metric tons of peat. Because these areas occupy only a small portion of the deltaic and chenier plains, there is potentially much more peat present in South Louisiana. Approximately 2000 samples, taken from about 200 auger holes and vibracores, were analyzed. Average values of Louisiana peat are 90% moisture, 80% organic matter (20% ash), a bulk density of 0.12 g/cm^3, and a Btu of 8515. The relationships between percent moisture and organic matter and between bulk density and depth indicate that compaction during the first few thousand years was minimal. Freshwater peats contain primarily kaolinite and quartz, whereas marine-influenced peats contain kaolinite, quartz, and water-soluble salts.

0120 Mining

REFER ALSO TO CITATION(S) 10471, 10633

9290 **(NP—4770095) Economic association of the coal mining industry.** (Rationalisierungsverband des Steinkohlenbergbaus, Essen (Germany, F.R.)). Jul 1982. 24p. (In German). NTIS (US Sales Only), PC A08/MF/A01. Order Number DE84770095.

The association supports the rationalization of black coal mining and other measures of its members which are of interest for the competitive position of coal mining. Apart from rationalization measures the association can also finance investments for the improvement of pollution control. As from 31st December 1981 the association has taken over the responsibility for the National Black Coal Reserve as another task.

9291 **(NP—4770096) Process for the analytical investigation of acyclic operational events in the bituminous coal mining presented by the example of a large-scale investigation of the development and withdrawal of shield faces.** Szponder, J.A. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 7 May 1982. 211p. (In German). NTIS (US Sales Only), MF A01. Order Number DE84770096.

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An investigation program for complex and acyclic operational events in the bituminous coal mining has been developed and it is presented and explained by the examples of the events 'Removing of shield-type support', 'Building in of face conveyor', 'Securing of working room'. The process is based on a detailed and programmed inquiry and evaluation work which was carried out in the entire region of the Bergbau AG Niederrhein of the Ruhrkohle AG.

9292 **(NP—4770109) Possibilities to transport shield-type support with a trackless device during installing of props in the German bituminous coal mining.** Rampelmann, J. (Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen). 23 Jul 1982. 111p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84770109.

The possibilities of the transport of a shield-type support for the preparation of a longwall face by an automobile vehicle was investigated by the operational example of a Ruhr mine representative for flat bedding. A commercially available vehicle was selected for the transport of the shield-type support. A nomogram was set up to determine the efficiency of the vehicle. The consumption of current for an entire transport case and the demand of time for the furnishing of the support were determined.

9293 **(NP—4770127) Model formulations for the mathematical-statistical evaluation of operation data as a planning assistance in the assessment of face operations in the bituminous coal mining.** Griesenbrock, H.P. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 14 Jun 1982. 142p. (In German). NTIS (US Sales Only), PC A07/MF 01. Order Number DE84770127.

Regression models based on comprehensive operating data collections were developed and tested for a sure assessment of the haulage capacity of face conveyors in the Ruhr bituminous coal mining. Starting from a critical view of the previously developed models for the assessment of face operations a factorial model has been developed considering the data in the form of utilization coefficients the parameters of which are not directly but iteratively determinable.

9294 **(PB—83-260380) Measurement of particulate emission using a British Coal Utilization Research Association cyclone probe fitted with a Whatman gf/a microfibre backing filter.** Walker, D.S.; Galbraith, R. (Warren Spring Lab., Stevenage (UK)). [nd]. 14p. NTIS, PC AE03/MF E03.

The use of Whatman GF/A Microfibre filter as an alternative backing filter for the British Coal Utilization Research Association cyclone probe was investigated because the standard BCURA backing filter gives rise to difficult sample recovery. A stainless steel GF/A filter holder was developed suitable for use with standard BCURA equipment and a vacuum pump. Preliminary comparative emission tests using each type of backing filter were carried out and similar results and easier sample recovery obtained. (Copyright (c) Crown Copyright.)

9295 **(PB—83-262360) Instruments and techniques for dynamic particle size measurement of coal dust. Open file report 1 Dec 76-30 Nov 80.** (Minnesota Univ., Minneapolis (USA). Particle Technology Lab.). Jan 1981. 243p. NTIS, PC A11/MF A01.

The purpose of this study was to conduct research in several areas of instrumentation used to determine the quantity of respirable dust in a mining atmosphere. The study was divided into eight tasks including (1) the feasibility of using a dichotomous impactor in conjunction with two photometers for a machine-mounted dust monitor, (2) development of a laser diode optical particle counter, (3) development of an instrument evaluation chamber, (4) instrument evaluations and calibrations, (5) development of a new personal respirable dust sampler, (6) development of a uniform deposit cascade impactor, (7) inertial impactor calibrations and theoretical investigations, and (8) descriptions of field studies.

9296 **Automated drilling and bolting.** Pazuchanics, M.J. (Dept. of Energy, Pittsburgh, PA); Ems, A.F. pp vp, Set No. 10, Paper 2 of 1982 Coal convention session papers. St. Louis, MO; American Mining Congress (1982). (CONF-8205192—).

From American Mining Congress coal conference; St. Louis, MO, USA (9 May 1982).

Roof support activities have been and continue to be one of the most dangerous activities in underground coal mining. The Department of Energy is presently engaged in a program to improve worker safety and productivity in the area of roof bolting. Currently, the Bendix Corporation is being funded by DOE to develop both resin and mechanical anchor bolter modules. The modules perform all the functions required to automatically and under remote control, place longer-than-seam-height roof bolts in low coal. The module's capabilities and primary hardware components are discussed with special attention being given to worker safety and to increase in productivity by combining the automated bolter modules with continuous miners into miner-bolter systems. Mine tests at Beth-Elkhorn Mine 26L in Jenkins, KY are briefly discussed. Figures are presented at the end of the article depicting the module and its operating sequence. (BLM)

0130 Transport And Handling

REFER ALSO TO CITATION(S) 9224

9297 **(DOE/PC/62690—T2) Evaluation of the effect of coal cleaning on fugitive elements. Phase IV. Identification of mineral forms in coal. Quarterly progress report No. 2, September 1-November 30, 1983.** Ford, C.T. (Bituminous Coal Research, Inc., Monroeville, PA (USA). National Lab.). 15 Dec 1983. Contract AC22-83PC62690. 27p. NTIS, PC A03/MF A01. Order Number DE84004763.

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Low temperature ashing of samples from the previous phases of this study, selected for use in determining mineral forms, was continued. Preparations were made for the installation of the x-ray diffractometers to be used along with the infrared spectrophotometer for determining the forms of minerals in the selected coal samples. Work Completed - Emphasis during this time period continued to be on the low-temperature ashing of the coals selected for determination of mineral matter and correlations of this mineral matter content with the trace-and-major-element data from the previous phases of this study. The total number of samples selected for this program ranged from about 360 to 370 depending on completion of material balances in one of the preparation plants. Initial examination of low-temperature ashing of these samples focused on optimization of instrument variables to obtain the desired ash in the time frame allotted to this project and, at the same time, keeping the temperature in the ashing chambers at a minimum to accomplish oxidation of the coal matter with minimal changes in the mineral matter. That effort continues. The refuse-type fractions containing little carbonaceous material are being ashed, as expected, at a much more rapid rate than are the clean and ultra-clean coal samples which are high in carbon content. Additionally, there was also the need to examine the characteristics, in particular, the particle size of the low-temperature ash produced, to determine whether further pulverization would be necessary to prepare the samples for ir and x-ray analyses. Eight samples were selected for this initial examination. The particle size data for the eight coals are tabulated. The analytical sample was separated at 325 mesh and the particle size distribution of the minus 325 mesh fraction was determined by Coulter Counter analysis. 16 figures, 4 tables.

9298 **(KHM-TR—95) Cleaning of coal by flotation.** Lindberg, T.; Thomaeus, M. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 42p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751397.

Three different coal samples, one from Poland and two from USA have been used as test material. The petrographic investigations clearly show that there exsists a relation between the structure and the grain size of coal and minerals, and the possibilities to sucessfully clean the coal by flotation and that the results of suggested flotation procedure can be predicted with good accuracy by the use of a microscope. The flotation investigations have shown that an effective reduction of the ash- and sulfur contents can be achieved by the grinding and the flotation of caols with a favourable structure. The testwork indicates that a more favourable composition of the ash and a better ashfusion point are obtained concurrently. Aliphatic alcohols are the type of collectors giving the best results. The Polish coal gave after grinding to $k_{80}=75\mu m$ a reduction of the ash-grade from 15.3 per cent to 4.3 per cent at a 95.6 per cent coal recovery. The sulfur content could be lowered from 0.66 per cent to 0.35 per cent. The structure and grainsize of the

ash- and sulfur-minerals were more unfavourable in the two USA-coals. USA coal I gave after grinding to $k_{80} = 75\mu m$ reduction of the ashgrade from 12.4 per cent to 9.5 per cent at a 98.7 per cent coal recovery. USA coal II gave at the same degree of grinding a reduction of the ashcontent from 16.8 per cent to 9.0 per cent at a 96.7 per cent coal recovery. The sulfur content could for USA I be lowered from 0.85 per cent to 0.71 per cent and for USA II be lowered from 1.19 per cent to 1.0 per cent. A certain improvement could be reached with an extreme fine grinding.

9299 **(TVA/OP/EDT—84/8) Batch sulfurmeter installation and testing at the Paradise Coal Preparation Plant.** Lynch, R.W.; Pray, G.B.; Humphris, D.A. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology). 1983. 39p. (CONF-8311129—1). NTIS, PC A02/MF A01. Order Number DE84900620.

From EPRI seminar on applications of continuous coal analysis to the elelctric power utility industry; Nashville, TN, USA (8 Nov 1983).

A prototype instrument developed by Science Applications, Inc., for online measurement of the sulfur content of coal has been installed at TVA's Paradise Coal Preparation Plant. This batch sulfurmeter analyzes coal using the principles of prompt neutron activation analysis and has the capability of returning an as-received sulfur value after a 100-second analysis time. The instrument operates in a continuous batch mode with approximately a 6-minute cycle time under normal operating conditions. This paper primarily discusses installation, startup, and early testing experience for the sulfurmeter. 12 references, 13 figures, 6 tables.

9300 **Flotation of coal using micro-bubbles and inorganic salts.** Yoon, R.H. (Virginia Polytechnic Inst. and State Univ., Blacksburg, VA). pp vp, Set No. 4, Paper 1 of 1982 Coal convention session papers. St. Louis, MO; American Mining Congress (1982). (CONF-8205192—). Contract FG22-80PC30234.

From American Mining Congress coal conference; St. Louis, MO, USA (9 May 1982).

It has been shown that coal flotation can be achieved in salt solutions without using a frother or a collector. The major advantage of this salt flotation technique has been found to be its fast flotation rate. The salts of divalent cations give the best flotation kinetics, which may be attributed to their ability to reduce the zeta-potential of coal more effectively than the salts of monovalent cations. Micro-bubbles, called colloidal gas aphrons (CGA), have been used for the flotation of fine coal. Preliminary results indicate that coal flotation using these small bubbles can make cleaner separations than the conventional technique the uses large air bubbles.

9301 **Coal preparation practices in India.** Bose, S.K. (Coal India Ltd., Calcutta, India). pp vp, Set No. 4, Paper 7 of 1982 Coal convention session papers. St. Louis, MO; American Mining Congress (1982). (CONF-8205192—).

From American Mining Congress coal conference; St. Louis, MO, USA (9 May 1982).

Until about 1951, India coals of Gondwana land were considered not commercially washable. With more and more washability tests and with technology developments in coal washing practices elsewhere in the world, ideas changed and the first washing plant was established in 1951. Technological developments that moved the coal preparation in India from that point to the current status of 15 washeries are discussed briefly. The current lack of facilities for preparation of coal for electrical generating plants is pointed out. Pilot plant trials of chemical leaching by alkali treatment for obtaining ashless coals are discussed briefly. The theme, Challenge of Washing Different Coals, has been selected for the IX Coal Preparation Congress. The format and other technical aspects of the Congress to be held November 29-December 4, 1982 in New Delhi are outlined. (BLM)

0140 Combustion

REFER ALSO TO CITATION(S) 9764, 10166, 10461

9302 **(DOE/PC/50254—T6) Investigation of vaporization and devolatilization of coal/water mixtures. Sixth quarterly report, August 1-October 31, 1983.** Solomon, P.R.; Hamblen, D.G.; Markham, J.R. (Advanced Fuel Research, Inc., East Hartford, CT (USA)). 20 Jan 1984. Contract AC22-82PC50254. 24p. NTIS, PC A02/MF A01. Order Number DE84005260.

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The objective of this program is to develop the capabilities to predict the vaporization and devolatilization behavior of coal/water mixtures under conditions appropriate for spray combustion. The program is currently collecting data in an entrained flow coal reactor which has a fixed position, coal/water slurry spray injector and a movable product extractor. This reactor is being used to study the vaporization and pyrolysis of coal/water slurries. FT-IR is used for the analysis of the product gases, tars and chars to determine species evolution kinetics and kinetics of secondary reactions such as steam-char reactions, cracking, soot formation, char gasification, censophere formation and particle swelling, and char reactivity. Pyrolysis calculations have been performed to compare with the data for the Pittsburgh Seam coal/water slurry collected in the reactor system at furnace temperatures of 1100°C and 1300°C. The general behavior of the various species indicates more conversion of aliphatics to CO and CO_2, compared to dry coal pyrolysis. Chars from slurry pyrolyses at 1100°C and 1300°C show substantial agglomeration.

9303 **(DOE/PC/50266—5) Vaporization and devolatilization of coal water sprays. Fifth quarterly report for the period ending November 11, 1983.** Chigier, N.; Meyer, P.L. (Carnegie-Mellon Univ., Pittsburgh, PA (USA). Dept. of Mechanical Engineering). 1983. Contract FG22-82PC50266. 23p. NTIS, PC A02/MF A01. Order Number DE84004070.

The objective of this research is to investigate fundamental processes leading to combustion of coal-water slurries. The research will be focused in two main areas: the vaporization of water from a coal-water slurry spray and the devolatilization of the coal particles in the spray. Work this quarter has focused on obtaining photographic records of a water spray. Different types of film, processing and lighting conditions have been used to determine the optimal photographic setting. Drop size, shape and distribution information have been determined through visual inspection of the photographs. Samples of coal-water slurry have also been analyzed by laser diffraction methods for particle size analysis. Microphotographs of dilute slurry samples have also been obtained for coal particle size and shape information. The spray test facility is being readied for measurements of coal-water slurry sprays. 1 figure, 2 tables.

9304 **(ICTIS/TR—24) Combustion of coal liquid mixtures.** Morrison, G.F. (International Energy Agency Coal Research, London (UK)). Nov 1983. 51p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE84900727.

Recent literature relating to the use of coal liquid mixtures (CLMs) as alternative fuels in oil-fired boilers is reviewed. Emphasis is placed on coal oil mixtures (COMs) and coal water mixtures (CWMs) although coal oil water mixtures and coal methanol mixtures are discussed briefly. Preparation and stabilization techniques and procedures for CLMs and beneficiated CLMs are described. The transport and handling of CLMs at power stations is covered briefly. The influence of fuel volatility, coal particle size, atomization and burner design on the mechanism of CLM combustion is described in detail. The relationship between fuel composition and the combustion products; nitrogen oxides, sulfur oxides and particulates, and the effect of ash on boiler equipment, are evaluated. It is concluded that despite the advanced development of COMs the technology has not found widespread application. The majority of effort is now devoted to CWMs, further development of which await large scale combustion trials. 153 references.

9305 (NP—4900378) Combustion characteristics of fine-ground coal. Briceland, C.L.; Khinkis, M.J.; Waibel, R.T. (Institute of Gas Technology, Chicago, IL (USA)). 1983. 50p. Institute of Gas Technology, 3424 South State St., IIT Center, Chicago, IL 60616.

The effect of coal particle size on pulverized coal flame and slagging/fouling characteristics for boiler application are determined. The replacement of high-cost liquid fuel with coal in utility and industrial boilers is the final goal of this project. An on-line milling and feeding system was constructed. The research furnace was equipped with a boiler type burner, water cooling radiative tubes along the combustion chamber walls, and gas cooling convective tubes in the flue. Most of the combustion trials were conducted at the high furnace exit gas temperatures typical of boilers designed for natural gas- and oil-firing. The coal fired in the tests was a highly volatile bituminous coal from Pittsburgh No. 8 seam. The combustion characteristics, slagging and fouling tendencies of three different coal particle sizes were studied, namely: 99.9% below 15.8 μm (average particle size 6.6 μm), 99.9% below 55 μm (average particle size 18.1 μm), and 99.9% below 148.0 μm (average particle size 41 μm). It was found that the flame length was reduced by about 60% from the largest to smallest particle size. The combustion intensity achieved for the finest grind of coal was more than twice that with the coarsest coal grind. The radiation heat flux and the overall amount of heat absorbed by furnace load was considerably higher for fine-ground coals compared to the coarser coals. The slag and ash deposition rate on the convective tube passes was reduced by about 80% with the finest coal compared to the coarsest coal. Nitrogen oxide emissions did not change with coal particle size. The finest coal (99.9% less than 15.8 μm) tested caused some feeding and transport difficulties; therefore, the feeding and transport systems for very fine coal should be further improved.

9306 Slagging behavior of coal ash in an experimental furnace. Singh, S.N. (Aqua-Chem, Inc., Milwaukee, WI); Austin, L.G.; Krauss, W.E.; Essenhigh, R.H. pp 35 p, Paper 2 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Coal has been fired in a laboratory-scale plug flow furnace to study slag deposition on water-cooled slagging tubes at the bottom of the furnace. The problem of slagging is a major factor of boiler availability; it has been under investigation for decades but it is still regarded as being only partly controllable where control has often been possible only by de-rating. Slagging mostly occurs at the level of the highest flame temperatures, but it can occur on the upper furnace walls; it can be particularly disruptive if it occurs on the superheater tubes. Boilers have sometimes been observed to remain clean for substantial periods of time; but when slagging does occur, it can do so with great rapidity. This has been interpreted as a process of surface conditioning. Once adhesion starts, even in a small patch, the thermal insulation effect allows the gas side surface of the patch to become even more adhesive because of the rise in surface temperature. If the patch surface slags, molten slag can flow down to cover and adhere to bare tube areas below. The patch also provides a location that may accelerate local conditioning and stimulate growth. With large enough deposits there can be substantial imbalance of heat transfer to the water. Locally, if the tube side of the deposit gets cold enough it can then freeze close to the tubes, and on occasion will crack off. Slag masses falling from the upper furnace have severely damaged or even broken the tubes above the ash pit.

9307 Heated grid study of the pyrolysis/oxidation competition during ignition of coal dust. De Soete, G.G. (Institut Francais du Petrole, Rueil-Malmaison, France). pp 33p, Paper 7 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Competition between the gas phase oxidation of pyrolytic products and the heterogeneous ignition of coal has been studied on different coals with special reference to the effect of particle size, temperature, and oxygen concentration. The consequences for the coal oxidation rate and for coal extinction have been discussed. Under typical conditions of particle size, temperature, and oxygen concentrations prevailing in industrial pulverized coal flames, whole coal ignition appeared to be the most frequent. The presence in the solid fuel molecule of a pyrolyzable fraction was found to have a promoting effect on ignition, decreasing substantially the ignition temperatures of coal compared to those of the corresponding chars. In the case of whole coal ignition, the pyrolysis reactions and the subsequent gas phase oxidation of the pyrolysis products, especially in the case where the latter takes the form of a deflagration, were found to be able to substantially reduce the combustion rate of the solid matrix, mainly due to a shielding effect with respect to oxygen diffusion to the solid. When this shielding effect ceased towards the end of pyrolysis, the carbon combustion rate of the coal could reach the same value as the one measured on char particles, provided the temperature of the surrounding gases was beyond the char ignition temperature. At grid temperatures lower than the char ignition temperature, whole coal ignition was found to be followed by incomplete combustion, the fraction of coal burnt before extinction of the partly devolatilized coal increasing with temperature. Quantitatively, this may be explained on the basis of the thermal ignition theory when applied to pyrolyzable solid fuels. (BLM)

9308 Fuel staging for pulverized coal furnace NO/sub x/ control. Kelly, J.T.; Pam, R.L.; Suttmann, S.T. (Acurex Corp., Mountain View, CA). pp 23p, Paper 8 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

A 16.1 kW idealized subscale combustor was used to define the NO/sub x/ emission control benefits of fuel staging. NO/sub x/ control is achieved by injecting coal, as well as combustion air, at two locations in the combustor. The NO/sub x/ and combustion product gases from the first-stage flame are mixed with fuel and air in the second stage and reburned. The fuel fragments, fuel nitrogen components, soot and char produced by the reburning interact with the previously formed NO/sub x/, reducing it to low levels within a fraction of a second. This combustion modification approach has lowered NO/sub x/ by over 70% from baseline levels. Current test results show that second-stage stoichiometry is a dominant process variable, and that effective NO/sub x/ reduction requires that the second stage be operated fuel rich. First- and third-stage stoichiometries and fuel fraction injected into the second stage were less important to the process, as long as the second stage was operated under fuel-rich conditions. Based on the test results of this study, process variable regimes were identified where fuel staging has a distinct advantage in controlling NO/sub x/ emissions over classical staging. These are cases where the first stage is operated fuel lean and the second stage is operated fuel rich.

9309 Experiments on pulverized coal combustion under conditions simulating a blast furnace environment. Bortz, S.; Flament, G. (International Flame Research Foundation, IJmuiden, Netherlands). pp 19p, Paper 10 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Combustion of pulverized coal under conditions simulating injection into a blast furnace was studied. Four coals were tested and the effects of coal flow rate, blast temperatures from 900°C to 1200°C, coal fineness, injection position and momentum, on the cumbustion of these coals were characterized through visualization and measurements. The performance of the coals was very dependent on the coal rank. The other parameters, particularly coal flow rate, also had a strong influence on the combustion rate. Indications are that the early combustion (< 10 ms) is determined by the devolatilization process with total volatile yields significantly in excess of the proximate analysis being measured for the bituminous coals. The combustion of the expelled volatile matter was found to be mixing limited, leading to soot formation. This problem was amplified with a high coal rate. The trial results indicate that the opti-

mum method of achieving a high burnout level with pulverized coal in the raceway zone of a blast furnace, particularly with the current injection system, is through a judicious selection of coal type and coal rate.

9310 **Evolution of Canada's coal-liquid mixture program.** Read, P.J.; Whaley, H.; Lee, G.K. (Energy, Mines and Resources Canada, Ottawa, Ontario). pp 19p, Paper 12 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Interest in coal-liquid mixtures as potential oil replacement fuels has been continuing in Canada since the early seventies. The motives for this interest have been the rapidly rising cost of oil coupled with an insecurity of supply. These factors have caused the western industrialized nations to seek feasible alternatives to petroleum-based fuels. A description is given of the three phases of an early program undertaken at Chatham, New Brunswick in which coal-oil mixtures were used in a small utility boiler. Phase I of this program showed that burner and equipment wear was a significant impediment to coal-oil mixture utilization. This led to the inclusion of an oil agglomeration coal beneficiation process being incorporated into the fuel preparation process as a means of reducing the sulphur and abrasive ash content of the coal. The evolution of this early program into the present program of coal-water slurry technology development for utility applications is described in detail, together with other support programs which may enable coal-liquid mixtures to penetrate the industrial and transportation sectors.

9311 **UK developments in industrial coal firing.** Highley, J. (NCB Coal Research Establishment, Stoke Orchard, England). pp 29p, Paper 20 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

To make coal more attractive for industrial users, the National Coal Board (NCB) is collaborating with boiler manufacturers to improve conventional firing equipment and ancillaries and to develop new concepts, particularly fluidized bed combustion. Most stoker types are now available with automatic electrical ignition, load following and ash removal. The NCB has operated three fluidized bed packaged boilers at industrial sites since 1977/1978, and the expertise and data gained have been applied in collaboration with manufacturers to design a range of fluidized-bed combustion (fbc) fire tube and water tube boilers, with outputs from 1 MW to 30 MW. Several commercial units, incorporating automatic start-up and load following are now in operation. Fbc units to produce hot combustion gases or clean heated air for drying kilns are also commercially available. An 85 MW pressurized fbc facility is being operated on behalf of the International Energy Agency. The NCB has encouraged the introduction of pneumatic coal conveying for handling coal on industrial sites. Two types are available, dense phase for any coal grade, including high content of wet fines, and dilute phase, a lower cost system for coals without fines. The use of pneumatic conveying of coal, and also of ash, together with coal and ash storage in closed bunkers or silos, ensures that coal firing offers a degree of cleanliness and reliability previously associated only with oil or gas firing.

9312 **Use of the pot furnace for the prediction of stoker performance.** Joyce, W.I.; Urquhart, W.M. pp 20p, Paper 24 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Thirty years ago Babcock Power Ltd. used a pot furnace test facility to carry out fundamental/development combustion studies and to evaluate the suitability of fuels for travelling grate and spreader stoker firing. Resulting from a revived interest in stoker firing, the facility has been re-established and fuel evaluation programs are currently in progress. This type of pot furnace testing gives considerable help to boiler and stoker manufacturers in designing plants suitable for the wide range of fuel and ash properties with which they are presently confronted and in coping with environmental and legislative constraints. The paper describes how, using small quantities of test fuel, information aimed at optimizing plant operation is obtained for both types of firing together with relevant performance data including combustion rates attainable, ash losses, grit carryover, air distribution and grate temperatures. The implications of such evaluations are discussed with reference to pertinent examples. To illustrate the range of the pot furnace as a development facility some projects are briefly described. An aspect of the latter to which the time/distance separation technique of the pot furnace lends itself is the study of pollutant emission and control and is seen as a high priority future activity.

0150 Marketing And Economics

REFER ALSO TO CITATION(S) 9290, 9337

9313 **(DOE/EIA—0121(83/3Q)) Quarterly coal report, July-September 1983.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). 10 Jan 1984. 88p. NTIS, PC A05/MF A01 - GPO. Order Number DE84005349.

The historical supply and demand data in this report are collected from quarterly coal surveys of manufacturers consuming coal, of companies distributing coal, and of coke plants plus two monthly surveys of electric utilities. In addition, data from the annual survey of coal mines appear in Appendix B, Annual Trends. All data for 1982 and previous years are final. All 1983 data are preliminary and subject to revision. Statistics are given for specific countries under broad headings of South America, Europe, Asia, Oceania, Africa, and North America. (PSB)

9314 **(DOE/EIA—0125(83/3Q)) Coal distribution, January-September 1983.** McNair, M.B. (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Dec 1983. 116p. NTIS, PC A06/MF A01 - GPO. Order Number DE84005362.

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Production and/or purchases of coal in the United States from January-September 1983 totaled 575.8 million short tons, 8.4 percent less than the 628.4 million tons produced or purchased during the same period of 1982. Distribution of coal during January-September 1983 totaled 579.1 million tons, a decrease of 6.1 percent from the 616.6 million tons distributed during January-September 1982 (Tables 1 and 14). Coal stocks in 1983 decreased 8.8 percent from 38.1 million tons on January 1 to 34.8 million tons on September 30. These ending stocks represented a 12.4 percent decrease when compared with the ending stocks of 39.7 million tons recorded for September 30, 1982. Statistics are presented by coal producing district; area; destination; consumer; and transport.

9315 **Economics of producing substitute natural gas from coal.** Rosenberg, J.I.; Ashby, A.B. pp 364-377 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Substitute natural gas (SNG) from coal offers the United States an abundant supply of gaseous fuel for many years to come. However, the growth of an SNG industry is currently impeded by many factors, not the least of which are its high initial cost and the magnitude of risk it imposes on investors. This paper examines the economics of producing SNG from coal under different assumptions regarding conversion technologies, coal types and plant financing. Using high debt financing and historical rates of return on investment, a dry bottom Lurgi gasification facility in the western US beginning in 1990 would require yearly plant gate cost-of-service prices ranging from about \$9.00 per 10^9J during the early years of plant life to about \$5.00 per 10^9 J (1982 \$) during its later years. Levelizing this price over its 30 year lifetime for comparative analytical purposes, the result would be just under \$6.00 per 10^9J. Advanced gasification processes may lower this price by between 10% and 25% if R and D goals are achieved. Finally, on a levelized

basis, SNG from coal under the above financing assumptions could be roughly competitive with natural gas and fuel oils over the same 30 year period. 21 references, 4 figures, 3 tables.

0160 Health And Safety

REFER ALSO TO CITATION(S) 9281, 9295, 9296, 10657, 10702, 10923, 10924, 10952

9316 **(CONF-8209202—1-Draft) Status report: solid waste management.** Francis, C.W.; Wobber, F.J. (Oak Ridge National Lab., TN (USA); USDOE Office of Energy Research, Washington, DC. Office of Health and Environmental Research). 1982. Contract W-7405-ENG-26. 48p. NTIS, PC A03/MF A01. Order Number DE84004903.

From ORNL life sciences symposium; Gatlinburg, TN, USA (1 Sep 1982).

Research results pertaining to potential health and environmental consequences of solid wastes produced by operating commercial-sized coal conversion plants were reviewed and evaluated. Some of these wastes contain toxic metals as well as mutagenic and carcinogenic organic compounds. The major problem, however, is the generation of solid waste leachates from the large volume of wastes, predominantly coal preparation wastes and gasifier ashes and slags. The most troublesome wastes appear to be those containing reduced forms of sulfur. When disposed of in landfills, these wastes will, with age and oxidation of sulfur, generate acidic leachates. These leachates will likely contain concentrations of toxic contaminants, such as Cu, Pb, Cd, Ni, etc., that will overtax natural attenuation or dispersal mechanisms, resulting in their harmful accumulation in surface and groundwater. Some of the organic wastes, such as electrostatic precipitator tars and oily sludges from wastewater treatment, are potential health hazards relative to their exposure at the coal conversion facility and to their handling in route to disposal sites. Further health and environmental research is needed to identify the risks associated with exposure to the work force as well as exposure to the general population as a consequence of landfill disposal practices. Health research should concentrate on investigating the effects of inhalation, contact with skin, and ingestion of wastes. Environmental research should address questions regarding long-term disposal. The major research goal should be the prediction of solid waste leachate movement in subsurface environments.

9317 **(KHM-TR—61) Mutagenicity tests of flue gas emissions from coal and oil fired plants. Investigation of the cells of Drosophila and mammals.** Jenssen, D.; Magnusson, J. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 42p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751381.

Mutagenicity tests have been performed with combustion emission samples from 8 and 2 plants respectively. Two test methods have been employed, pointmutations in Chinese hamster cells (V79/HGPRT-system) and sex linked recessive lethal mutations in male germ cells of fruitflies (Drosophila melanogaster). The tests on V79 hamster cells were performed on emission samples, which were divided in four fractions in connection with the sampling. From each plant the following fractions were collected: particles larger than 2 μmeter, particles smaller than 2 μmeter, a concentrated sample of a cryocondensate and a XAD-2 extract. The result indicate that the combustion emission from large plants are less mutagenic than from small ones, both for oil- and coal-fired plants. However the combined oil/coal plant constituted an exception. Its emission extract showed the highest value of mutagenicity. If this plant is disregarded, one finds a close correlation between total amount of particles per m^3 emission and mutagenicity per m^3 for the remainign 7 plants. The combined effect of combustion samples and known mutagens was investigated. Such comutagenic components were indicated mainly in emission sample from oil-fired plants. Investigations were also performed in order to study differences in metabolism of polycyclic hydrocarbons between lung macrophages of different species. From Syrian hamster embryonic fibroblasts exhibited 20 times higher metabolism of the promutagens than lung macrophages of the same species. These pieces of information may be critical for risk evaluations, based on inhalation experiments on different animals particle samples from combustion plants.

9318 **(KHM-TR—63) Variations in particulate effluent mutagenicity from a coal fired boiler.** Victorin, K.; Ahlborg, U.G.; Staahlberg, M.; Honkasalo, S. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 33p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751383.

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The mutagenicity has been measured in 58 fly ash samples, each collected during 1-2 hours, during a two-week period from a 300 MW sub (t) pulverized coal fired boiler. The samples were taken on glass-fibre filters with a High Volume sampler at 110 degrees-125 degrees C. The mean of the specific mutagenicity of the fly ash samples was 25 revertants/mg (Salmonella TA 100 with metabolic activation, S9) with the standard deviation +- 13 = 54%. No correlation to the CO-concentration could be seen, nor was there any other obvious explanation to the variation. The mutagenicity per m^3 smoke gas varied more than the specific mutagenicity per mg fly ash. The mean was 520 revertants/m^3 and the median 434 rev/m^3 (lognormal distribution). The mean is equal to about 230 revertants/MJ and the median 201 rev/MJ. THe highest mutagenicity occurred during start-up of the boiler, mainly because of a high emission of particulates. The difference between this sample and the sample showing the lowest mutagenicity was 54 times. There was a correltation ($r = 0.76$) between the effluent of particles (mg/m^3) and mutagenicity (revertants/m^3). No correlation to other variables was noted.

9319 **(KHM-TR—79) Health effects due to the emission of mercury on the combustion of coal.** Berlin, M. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 118p. (In Swedish). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83751377.

This report describes the health risks connected with exposure to different Hg compounds and the relevance of these risks in connection with increased coal combustion in Sweden. The following types of Hg exposure are discussed: 1. exposure to Hg vapor, 2. exposure to inorganic divalent Hg compounds, and 3. exposure to MeHg via intake of fish. Inhalation of Hg vapor results in accumulation of Hg in the nervous system, especially the brain. Exposure to divalent Hg salts through intake of drinking water or food containing Hg of by absorption through the skin can result in renal damage to impairment of renal tubuli function. Recent or ongoing exposure to Hg or inorganic Hg compounds is revealed in the Hg concentration in blood and urine. MeHg in fish is absorbed to more than 90 % in the human gastrointestinal tract. In the adult, 10 % of the body burden of MeHg is accumulated in the brain, and a larger part is found in the fetal brain. Through epidemiological studies involving assessment of Hg concentrations in hair of mothers during pregnancy and the development of the child mentally and in respect to motoric functions, risk of impairment of the developing brain has been estimated for different Hg concentrations in hair of the mother. In the report actions are discussed which could be taken to improve our information and knowledge to allow a better risk estimation concerning the health effects of MeHg exposure in Sweden.

0170 Legislation And Regulations

REFER ALSO TO CITATION(S) 9286, 9288, 9290, 9990

9320 **(DOE/RA/35008—T1) Use of the National Coal Model (NCM) in production goal analysis. Final report.** (Synergic Resources Corp., Bala-Cynwyd, PA (USA)). 7 Feb 1980. Contract AC01-79RA35008. 59p. NTIS, PC A04/MF A01. Order Number DE84004618.

The use of the National Coal Model (NCM) in the Coal Production goals analysis conducted by the Leasing Policy Development Office (LPDO) of DOE is discussed with the objective of determining how the portion of the production goals analysis presently dependent on the NCM could be improved, either through modifications to the NCM data or structure, or, perhaps through

the use of alternative models. The review of comments of the production goal analysis is presented in Chapter II; the Energy Modeling Forum review in Chapter III. Chapter IV compares the NCM and EPRI/CRA models. These discussions provide the rationale for the following conclusions: The NCM projections track very close to central tendency of other models when the models operate upon commente defined input scenarios. Efforts should be concentrated on improving model data and structure, rather than in selecting or developing replacements to the NCM. When compared with the CRA model, the NCM is generally more appropriate for production goals analysis. However, the CRA regional model mine approach suggests some improvements to the NCM.

9321 **(DOE/RA/35008—T2) Coal production forecasts in the 1978 ARC: an analysis of problem areas. Final report.** (Synergic Resources Corp., Bala-Cynwyd, PA (USA)). 25 Mar 1980. Contract AC01-79RA35008. 98p. NTIS, PC A05/MF A01. Order Number DE84004617.

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This report presents an analysis of identified problem areas in the National Coal Model (NCM) supply curve submodel, the Reserve Allocation and Mine Costing (RAMC) submodel. The RAMC generates supply curves which are used in both the NCM and the MEMM system that generates the forecasts for the Annual Report to Congress. The study begins with a summary of defined problems with the 1978 ARC forecasts of coal production and prices. A general discussion of these problems is given in Chapter II. Chapters III and IV address the two major portions of the RAMC: the reserve base and the mine costing algorithms. In Chapter III, the reserve base in selected states is reviewed and related to the problem areas discussed in Chapter II. Chapter IV discusses the problems associated with mine costing.

02 PETROLEUM

REFER ALSO TO CITATION(S) 9218

0202 Geology And Exploration

REFER ALSO TO CITATION(S) 9327

9322 **(SAND—83-7462) Offshore in-situ testing techniques, 1983.** McNeill, R.L.; Noorany, I. (McNeill (Robert L.), Albuquerque, NM (USA); San Diego State Univ., CA (USA)). Dec 1983. Contract AC04-76DP00789. 106p. NTIS, PC A06/MF A01. Order Number DE84005395.

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This report is a summary of current offshore geotechnical in-situ testing techniques as of mid-1983. It is an update and expansion of an earlier effort (Noorany, 1981) and was accomplished by a comprehensive literature survey, interviews with prominent geotechnical engineers in the US and Europe, and site visits to North Sea countries involved in oil and gas development. 32 references, 41 figures, 3 tables.

0203 Drilling And Production

9323 **(CONF-800563—2) Retention of polyacrylamide by berea sandstone, baker dolomite, and sodium kaolinite during polymer flooding. Paper SPE 8981.** Meister, J.J.; Pledger, H. Jr.; Hogen-Esch, T.E.; Butler, G.B. (Florida Univ., Gainesville (USA)). 1980. Contract AS05-78ER05947. 13p. Society of Petroleum Engineers of AIME, 6200 N. Central Expwy, Dallas, TX 75206.

From SPE international symposium on oil field and geothermal chemistry; Stanford, CA, USA (28 May 1980).

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Surface charge and accessible surface area control the retention of polyacrylamide by berea sandstone, baker dolomite, and sodium kaolinite. Hydrolysis of polyacrylamide increases retention by materials with a positively charged surface, such as dolomite, and decreases retention, when surface area remains constant, on materials with negatively charged surfaces, such as sandstone. Additives which form a more theta or less effective solvent promote retention. Water becomes a less effective solvent for polyacrylamide when its salt content is increased or when nonsolvents, such as alcohols, are added to it. Berea sandstone cores retained over 50 percent of polyacrylamide injected under all salinities, polyacrylamide concentrations, and degrees of hydrolysis tested and sodium kaolinite retained over 90 percent of all injected polyacrylamide under the same conditions. In contrast, baker dolomite, a high purity dolomite, retains only 17.9 percent of the unhydrolyzed polyacrylamide injected. Since bera sandstone contains 7.5 percent kaolinite, these data suggest that clay content has a significant effect on total polymer retention. Flocculating sodium kaolinite, which reduces its accessible surface area by over 80 percent, reduces retention by 70 percent, from 1217 $\mu g/g$ to 360 $\mu g/g$. With other variables held constant, reduction in accessible surface area will reduce retention of polyacrylamide by a porous medium as long as adsorption dominates the retention process. 24 references, 15 figures, 2 tables.

9324 **(DOE/BETC/QPR—83/2) Liquid fossil fuel technology. Quarterly technical progress rport, April-June 1983.** Linville, B. (ed.). (USDOE Bartlesville Energy Technology Center, OK). Oct 1983. 74p. NTIS, PC A04/MF A01. Order Number DE84005014.

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Highlights of research activities for the quarter ending June 1983 are summarized under the following headings: liquid fossil fuel; extraction; processing; utilization; and project integration and technology transfer. BETC publications are listed. Titles of featured articles are: (1) chemical flooding field test produces 975,000 barrels of oil; (2) chemicals boost recovery in steam-drive tests; (3) North Dakota carbon dioxide minitest successful; (4) carbon dioxide EOR reports issued; and (5) BETC slated for new management and new name. (ATT)

9325 **(DOE/CE/15087—T1) Hydraulic pumping unit. Final technical progress report.** Eastman, G.G. (Eastman (Gerald G.), Ochelata, OK (USA)). [nd]. Contract FG01-82CE15087. 5p. NTIS, PC A02/MF A01. Order Number DE84005276.

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After testing the hydraulic pumping unit for 18 months, the author feels it has a definite place in the oilfield equipment market. The most outstanding feature about the unit is the length of stroke. In conventional pumping units for example, to get a stroke length of 6 feet one would have to buy a unit costing from 40 to 60 thousand dollars. A conventional unit this size would be designed for wells over 4000 feet deep. However, there are many wells between 1000 and 4000 feet in depth that produce a large percentage of salt water along with oil, that need a long strike pumping unit. On these marginal type wells it is not feasible to use a large expensive unit. The primary reason for using a long stroke unit is to improve the efficiency of the down hole pump. In dealing with down hole pump efficiency, one has to contend with the stretching of the string of sucker rods. By using the same pumping horsepower, one can lengthen the stroke, and at the same time slow the stroke speed down, to create a more efficient down hole pump. This also extends the life of the sucker rods, down hole pump, and polish rod liner.

9326 **(DOE/MC/16140—6) Determination of miscibility pressure direct observation method. Final report.** Wang, G.C. (Alabama Univ., Tuscaloosa (USA). Dept. of Mineral Engineering). Jan 1984. Contract AC21-81MC16140. 98p. NTIS, PC A05/MF A01. Order Number DE84005118.

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A method is described for direct determination of minimum miscibility pressure (MMP) between CO_2 and crude oil by utilizing a high pressure visual cell. CO_2 was allowed to mix, circulate and recycle through the crude oil in the visual cell. The development of different phases, the swelling of crude oil and the disappearance of the phase boundary between displacing CO_2 and displaced crude oil marking the minimum miscibility pressure were clearly observed and photographed. MMP tests were carried out on crude oils rang-

ing from 15° API to 48° API at temperatures from 70°F to 140°F. Liquid and vapor samples were extracted from the transparent cell at the miscibility condition to understand CO_2-crude oil miscibility through chemical analysis by a gas chromatograph. A CO_2-rich less dense liquid phase, believed to be formed by the extraction of the C_5-C_{20} components of the crude oil, was found to be miscible at the forward contacts of the miscible transition zone due to enrichment through multiple contacts. Chemical analysis with gas chromatograph showed that the amount of the CO_2-rich less dense liquid and thus the quality of the miscible transition zone are determined by oil-composition particularly the quantity of C_5-C_{20} components in the crude oil. A small amount of CO_2-rich less dense liquid was generated for a low C_5-C_{20} content crude oil and the displacement was primarily of the immiscible type and recovery was largely due to viscosity reduction and swelling. CO_2 injected at liquid state also extracted C_5-C_{20} components and eventually became miscible with crude oil. 13 references, 36 figures, 4 tables.

9327 (NP—4900577) Gulf of Mexico summary report. Wiese, J.D.; Slitor, D.L.; McCord, C.A. (Rogers, Golden and Halpern, Inc., Reston, VA (USA)). Sep 1983. 127p. OCS Information Program, Office of Offshore Information Services, Minerals Management Service, MS 640, 12203 Sunrise Valley Dr., Reston VA 22091.

For the near future, the Gulf of Mexico will remain the most developed Outer Continental Shelf (OCS) region in the United States and the world. Virtually all production from the US OCS emanates from the Gulf of Mexico. In calendar year 1982, for the two primary categories of hydrocarbons produced from the US OCS (oil/condensate and gas), Gulf production accounted for over 90 and 99 percent, respectively. Gulf OCS oil production for 1982 was 290 million barrels (46 million m^3), and gas production was 4.66 trillion cubic feet (130 billion m^3). Although most of the shallow-water areas of the Gulf of Mexico Continental Shelf have been explored, considerable amounts of hydrocarbons may yet be discovered in deepwater locations or in deep pay zones in shallower water. Industry has been developing the technology to explore deepwater areas, and interest in these portions of the Gulf has been increasing. Between December 1981 and December 1982, the total of all identified oil and gas fields in the Gulf of Mexico OCS had increased from 505 to 537. The Department of the Interior's July 1982 final 5-year OCS oil and gas leasing schedule projects one to three Gulf of Mexico lease sales or offerings per year through 1987, for a total of 12. To date, most of the oil and gas discoveries in the Gulf have occurred on the Texas-Louisiana Shelf, but in the future, oil and gas exploration is likely to include a number of areas where previous leasing has not been extensive. Each year, hundreds of miles of pipelines are added to the existing network in the Gulf of Mexico. 73 references, 7 figures, 15 tables.

9328 (SAND—83-2096) Needs in drilling technology research and development. Carson, C.C. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 6p. NTIS, PC A02/MF A01. Order Number DE84001420.

This paper briefly discusses findings from a recent study of needs in drilling research and development that was conducted at Sandia National Laboratories for the Office of Energy Research of the Department of Energy. The purpose of the study was to identify areas in which research and development are necessary in order to meet future drilling requirements. The following three subjects were highlights of this discussion: (1) energy resources that must be extracted in the future will be different enough from current resources to present drilling systems; (2) some of the ways in which current systems will evolve to meet the challenges can be foreseen; and (3) it is possible to identify areas where the drilling requirements of future resources will not be met. The complete study will be documented in a soon-to-be-published final report.

9329 Unsteady-state pressure response due to production with a slotted liner completion. Spivak, D.; Horne, R.N. (Stanford Univ., Palo Alto, CA). *Journal of Petroleum Technology;* **35**: No. 8, 1366-1372(Jul 1983). Contract AT03-80SF11459.

The transient behavior of production from a well with a slotted liner has been solved analytically by the source function method. The unsteady-state pressure response was examined as a function of slot frequency and slot length, with a penetration ratio of 1:2. The results indicate that limited entry into the well causes skin effects. However, the effects become negligible when three or more slots are distributed around the circumference of the liner. For more than three slots, the well effectively behaves like a continuous-surface cylindrical source (or a line source well, depending on time and location). The authors conclude that there is likely to be little reduction in flow efficiency in an ideal slotted liner completion, unless some slots are clogged.

9330 Prop transport in vertical fractures: settling velocity correlations. Clark, P.E.; Guler, N. (Univ. of Tulsa). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11636**: 327-332(Mar 1983). (CONF-830305—). Contract AC21-80BC10197.

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

The settling velocity of propping agents is a critical variable in the calculation of proppant distribution in a fracture. Most computer programs available in the industry today base estimates of settling velocity on a Stokes' Law type calculation. We have found that significant deviations from Stokes' Law settling velocities occur in cross-linked fluids and uncrosslinked fluids (concentrations in excess of 0.48%). This paper discusses experimental results obtained with a dynamic system and the implications which these data have on prop transport calculations. In addition, correlations have been derived which can be used to predict the settling velocities of particles in cross-linked gels. A discussion of these correlations will be included.

0204 Processing

REFER ALSO TO CITATION(S) 9324

0205 Products And By-products

9331 (CONF-821262—1) Applications of petroleum coke. Frank, K. (Technische Hochschule Aachen (Germany, F.R.)). [nd]. 29p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84770102.

From Seminar on fuel upgrading; Aachen, F.R. Germany (16 Dec 1982).

Petroleum coke, a solid fuel of oil derivation, which has increasingly been produced in the refineries throughout the world for decades and has helped whole branches of industry - like the aluminium industry with its anode coke and the electric furnaces with their graphite electrodes - to gain prosperity, meets with an increasingly broadening field of application in its quality grade of fuel coke. With many applications, it offers decisive advantages over other types of solid fuels whose very application in many cases it has rendered possible for the first time. For those plants allowing application of petrol coke as the only solid fuel, it represents nearly the only opportunity to lower energy cost considerably. Its safety-technological aspects are another asset allowing easy and no-problem handling of ground and unground petrol coke nor are there any safety-technical problems with the grinding process.

9332 Chemical aspects of the utilization of heavy oil residua. Yen, T.F.; Chilingar, G.V. (School of Engineering, University of Southern California, Los Angeles, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **2**: 523-526(Aug 1983). (CONF-830812—). Contract AT03-76EV10017.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Heavy oil residua can be both naturally occuring and synthetic. The former class of substances, usually referred to as bituminous, occur in abundant quantities worldwide. Roughly speaking the bituminous materials consist of various asphaltic substances between petroleum and coals, e.g., mineral waxes, asphalts, asphaltoids, asphaltites, etc. The latter classes, so called synthetic liquids, are mostly derived from thermal pyrolysis of kerogens or biomass,

however, a minor quantity results from the byproducts of chemical synthesis such as polymerization or FischerTroposh reactions. In the past the usage of those heavy oil residua was limited to supplementary fuel or such applications as paving and roofing. As the scientific understanding increases for these abundant resources, not only do traditional uses increase but also discovery of novel and potentially unusual applications is possible. Some new and novel applications are examined and compared with traditional usages.

0206 Health And Safety

REFER ALSO TO CITATION(S) 9317, 10657, 10923

9333 **(PB—83-257436) Control technology assessment of selected petroleum refinery operations.** Emmel, T.E.; Lee, B.B.; Simonson, A.V. (Radian Corp., Salt Lake City, UT (USA)). Jun 1983. 128p. NTIS, PC A07/MF A01.

A Major research area for NIOSH is the evaluation of control technologies which may be used to reduce occupational exposures to potentially toxic chemical substances and harmful physical agents. The primary purpose of this study conducted by Radian Corp. was to identify and evaluate examples of good employee exposure control techniques associated with several petroleum refining operations: lube oil and wax processing and packaging; catalytic reforming and aromatics extraction; oil-water separation; alkylation; and hydrogen sulfide handling. In-depth visits were conducted at seven petroleum refineries across the U. S. and successful employee exposure controls were documented and evaluated. The information obtained from the program will be disseminated to the industry and other interested parties. This information transfer is designed to promote the use of successful exposure control ideas.

0207 Marketing And Economics

REFER ALSO TO CITATION(S) 9327, 9980, 10025

9334 **(DOE/EI/06448—T2) System development/operation and data collection/reconcilation for forms EIA-23 and EIA-64A. Final closeout report, July 15, 1978-September 30, 1981.** (Oklahoma Univ., Norman (USA). Energy Resources Inst.). 1 Oct 1981. Contract AC01-78EI06448. 38p. NTIS, PC A03. Order Number DE84005204.

Paper copy only, copy does not permit microfiche production.

Data are summarized and evaluated for 1977 through part of 1980 for domestic oil and gas liquids for production and reserves. The work involved the following four major activities: (1) the development and improvement of manual and automated procedures to receive, track, process and reconcile the data collected, (2) the development and maintenance of computer software to support various program activities, (3) the maintenance, evaluation, and improvement of the statistical survey frame, and (4) the monitoring of a network of state agencies under subcontract to assist in data reconciliation.

9335 **(DOE/EI/06448—T3) System development/operation and data collection/reconciliation for forms EIA-23 and EIA-64A. Final report: 1979 report year processing, May 15, 1980-May 15, 1981.** (Oklahoma Univ., Norman (USA). Energy Resources Inst.). 15 May 1981. Contract AC01-78EI06448. 119p. NTIS, PC A06. Order Number DE84005187.

Paper copy only, copy does not permit microfiche production.

No major difficulties were encountered in the data collection and evaluation of domestic oil, and gas reserves. Evolution of the systems required to process the data continued as additional refinements were identified and implemented. As in Phase II, the primary goal of these refinements was to improve the level of control exercised over the various processing activities. A further goal was to continue introducing greater efficiency in both the manual and computerized systems. In order to alleviate the critical dependence upon petroleum engineers and geologists to evaluate EIA-23 and EIA-64A submissions, a restructuring of the forms editing approach was planned and implemented, resulting in increased utilization of nongeologic staff to handle more of the routine processing under the supervision of senior analysts. This procedure significantly reduced the number of petroleum engineers and geologists required and allowed forms editing to continue at the same processing level, while reducing overall contract expenditures. Recommendations are included for future processing.

9336 **(DOE/EI/11547—T1) State of Connecticut middle distillate monitoring program. Report for July 1982-June 1983.** Gorman, R. (Connecticut Office of Policy and Management, Hartford (USA). Energy Div.). Jun 1983. Contract FG01-82EI11547. 14p. NTIS, PC A02/MF A01. Order Number DE84005351.

Statistical data are reported from monthly monitoring Connecticut fuel oil dealers on retail prices, wholesale prices, sales volume, and inventories. (PSB)

9337 **(DOE/EI/11815—T5) Collection, reduction, operation, maintenance and documentation of energy data for the petroleum industry. Final report.** (Sterling Systems, Inc., McLean, VA (USA)). 1983. Contract AC01-81EI11815. 26p. NTIS, PC A03/MF A01. Order Number DE84004729.

During the period of July 1982 to September 1983, contract number DE-AC01-81EI11815 consisted of ten tasks within the Department of Energy's Energy Information Administration. Tasks 101, 103 and 104 consisted mainly of data entry and analysis operations, documentation and archival of three surveys within the Petroleum Marketing Division of EIA, with task 103 also including software development for the new survey form. Tasks 105, 106 and 107 were analysis tasks of the future of World Coal Trade for the Coal Statistics Branch. Tasks 108 and 110 included the development, implementation, and operation of data collection efforts for two Federal Energy Regulatory Commission forms for the Petroleum Supply Division. Tasks 109 and 111, also for the Petroleum Supply Division, were software conversion efforts consisting of system analysis, design, programming, and documentation for two current surveys. A brief explanation of each task is presented with a list of scheduled deliverables and the delivery date.

9338 **(DOE/PE/70106—T8) Alternative mechanisms for drawing down the Strategic Petroleum Reserve: forward-based markets compared with auction-only mechanisms.** (Harvard Univ., Cambridge, MA (USA)). [nd]. Contract AM01-79PE70106. 61p. NTIS, PC A04/MF A01. Order Number DE84004723.

For the drawdown of the Strategic Petroleum Reserve (SPR) during a supply disruption, most of the attention has gone to proposals to auction off SPR oil during an emergency. Alternatives to supplement auctions through additional strategies that use forward-based markets are discussed. Strategies to be established prior to any crisis, in particular, a proposal for ongoing sales by DOE of options on SPR oil, are presented. Strategies intended for use during a crisis itself - in particular, proposals to sell futures on SPR oil or to conduct auctions for future delivery are proposed. Goals are twofold: to present these proposals and to outline how they would work, and to compare the proposals to reliance on an auctions-only strategy. In addition, the proposals are compared to each other.

9339 **(NP—4770099) MWV annual report 1982.** (Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.)). 1983. 50p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84770099.

Portions are illegible in microfiche products.

The annual report of the mineral oil trade association contains informations about the situation of the mineral oil economy, the importance of the mineral oil in the entire energy economy and the mineral oil supply and consumption. An excess of the offer of the raw petroleum, decreasing consumption of primary energy and mineral oil and low capacity use of the refineries are indicated. The order for largefiring plants and the TA-air are discussed particularly within the measures for environmental protection. Protective measures for surface tanks and the use of automobile gas and methanol as motor fuels are treated among new technical developments.

9340 **Modeling the number of bids received for outer continental shelf leases by Poisson-type models.** Bruckner, L.A.; Nachtsheim, C.J. (Los Alamos Natl. Laboratory, Los Alamos, NM). *Journal of Petroleum Technology;* **35**: No. 8, 1263-1267(Jul 1983).

Since 1954, the U.S. federal government has held hydrocarbon lease sales for areas on the Outer Continental Shelf (OCS). The U.S. DOE is charged with developing lease sale policies designed to increase competition on the offered tracts. Increased competition has been assumed synonymous with increased number of bids (NOB). To study the influence of alternative bidding systems on the number of bids received, a mixed Poisson-type model has previously been employed. The authors show why this model is not statistically supportable. A truncated model is proposed and is shown to be statistically justified for the number of solo bids over all sales and marginally supported for the number of joint bids on sales before the joint-bidding ban.

9341 **Uncertainties about future world oil prices.** Kilgore, W.C.; Sandoval, A.D. (U.S. Dept. of Energy). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11095**: 1-8(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

Projections of world oil prices are made with the knowledge that circumstances surrounding the world market can change abruptly, often as the result of political considerations. The ability to produce oil and the overall demand for oil change less rapidly. Anticipated world developments in these areas suggest that prices, adjusted for inflation, could easily remain flat through 1985 and then rise steadily during the next 10 years, doubling by 1995.

9342 **Energy conservation after decontrol: economic consequences of alternative policy choices.** Klein, Y.; Hill, L. (Argonne National Lab., IL). pp 750-752 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL ; Univ. of Miami (1982). (CONF-811212—). Contract W-31-109-ENG-38.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

0208 Waste Management

REFER ALSO TO CITATION(S) 9266

9343 **(PB—83-259788) Dispersants for oil spills clean-up operations at sea, on coastal waters and beaches.** Cormack, D.; Lynch, B.; Smith, J. (Warren Spring Lab., Stevenage (UK)). [nd]. 13p. NTIS, PC AE03/MF E03.

The first part of this report provides general background information concerning the formulation, composition and usage of materials intended to disperse oil. The second part of the report gives details of the specification for dispersants used for oil spill clearance at sea, on coastal waters and beaches. The third part describes the procedure to be followed in submitting dispersants for approval. Finally, relevant Warren Spring publications, concerning usage of dispersants, are listed. In view of the possible widespread usage of this specification it must be pointed out that this report has been produced primarily for use in the United Kingdom.

9344 **(PB—83-259838) Studies on the use of helicopters for oil spill clearance.** Martinelli, F.N. (Warren Spring Lab., Stevenage (UK)). [nd]. 24p. NTIS, PC AE03/MF E03.

A program of work was undertaken to assess the use of a commercially available underslung cropspraying bucket for spraying oil spill dispersants. The study consisted of land-based trials to measure relevant parameters of the spray and the effect on these parameters of spray height and dispersant viscosity. A sea trial was undertaken to observe the system under realistic conditions. (Copyright (c) Crown Copyright.)

9345 **(PB—83-260018) Investigation of the demulsification of water-in-oil emulsions formed when crude oil or fuel oil is spilt on the sea.** Lee, M.A. (Warren Spring Lab., Stevenage (UK)). [nd]. 16p. NTIS, PC AE03/MF E03.

The highly viscous water-in-oil emulsions, formed when crude or fuel oil is spilt at sea, are difficult to collect, and expensive to transport as they contain 50 to 80% water. Laboratory experiments have been carried out to determine the factors to be considered in the demulsification of these emulsions. The important factors were found to be the choice and amount of demulsifier, the temperature, and the time amount of mixing during the addition of the demulsifier. These preliminary findings will be used to develop large-scale demulsification systems for use at sea and on the beach, during collection of the emulsions. (Copyright (c) Crown Copyright 1980.)

9346 **(PB—83-260281) Characterization and treatment of aqueous wastes and residue from petroleum refineries. Final report 1 Oct 79-30 Sep 82.** Burkes, S.L.; Wagner, J. (Oklahoma State Univ., Stillwater (USA)). Sep 1983. 147p. NTIS, PC A07/MF A01.

This research project was designed to identify process wastewaters which contained a significant proportion of the total load of contaminants in petroleum refinery wastewaters and to evaluate methods for intensively treating these highly concentrated low-volume streams. In addition, selected waste residues from API gravity separator, dissolved air flotation units, and 'slop' oil emulsions were analyzed to determine the presence of hazardous chemicals as listed by EPA's Office of Solid Waste. Process wastewaters from the fluid catalytic cracking units, crude desalting unit, coking unit, and barometric condensor contained the highest levels of contaminants. These process wastewater streams were major contributors to the total load of phenol, ammonia, sulfide, and organic carbon contamination of the combined refinery wastewaters.

0209 Environmental Aspects

REFER ALSO TO CITATION(S) 9284

9347 **(PB—83-257212) Report to SOTEAG (Shetland Oil Terminal Environmental Advisory Group) on salt marsh monitoring around Sullom Voe in 1981.** Dalby, D.H. (Imperial Coll. of Science and Technology, London (UK)). [nd]. 34p. NTIS, PC AE04/MF E04.

A general summary of the survey work carried out on salt marshes close to Sullom Voe Oil Terminal in Shetland is given. Using transects levelled as in previous years, it is shown that there is a distinct accretion of marine sedimentary material which tends to be associated with the presence of the grass Puccinellia maritima. Any change in distribution of this material, in distribution of the grass, or in the stolon lengths of the grass was shown not to be due to the nearby oil terminal, and any oil spillages which might have occurred there. Furthermore, it is reported that damage caused in 1979 to some marsh is being repaired naturally. The results of a study initiated in 1976 to obtain figures for the accumulation of salt marsh surface, following the way in which small patches of strewn sand are affected by accretion, are given.

9348 **(PB—83-260455) Clearance of oil from water surfaces: the oil mop recovery device.** Wayment, E.C. (Warren Spring Lab., Stevenage (UK)). [nd]. 12p. NTIS, PC AE03/MF E03.

This report describes the evaluation of the Oil Mop recovery device, which is based on the continuous adsorbent belt principle and is intended for the recovery of oil from water surfaces. Various types of oil, and several oil slick thicknesses, were used in the evaluation. Results show that the device performed very efficiently in the circumstances described in this report. In addition it was found that the use of an insoluble surfactant, in this case Shell Oil Herder, could enhance performance when the oil slick was thin and patchy, otherwise under these conditions secondary oil/water separation was found necessary. This could be achieved in a satisfactory manner by discharging the mop contents into a drum containing a

section of the absorbent belt. (Copyright (c) Crown Copyright 1978.)

9349 **(PB—83-260521) Fate of controlled oil spills at sea.** Lynch, B.W.J. (Warren Spring Lab., Stevenage (UK)). [nd]. 20p. NTIS, PC AE03/MF E03.

This report summarizes and analyses the results obtained from a number of experimental controlled spillages of oil at sea involving the use of a number of different crude oils and a heavy fuel oil. The two processes examined in detail were the rate of evaporation of the volatiles and the rate of formation of a water-in-oil emulsion (mousse) through wave motion. The times for the various crude oils to become resistant to treatment by dispersants varied. (Copyright (c) Crown Copyright.)

9350 **(PB—83-261172) Assessment of the mackay apparatus for testing oil-spill dispersants.** Crowley, S. (Warren Spring Lab., Stevenage (UK)). [nd]. 28p. NTIS, PC AE04/MF E04.

The report describes an initial evaluation of the Mackay apparatus for the assessment of oil spill dispersant performance. Two oils and four dispersants were tested at two levels of turbulence. Various aspects of the apparatus, method and results are discussed with reference to a parallel series of tests using the Warren Spring Laboratory revolving flask method. (Copyright (c) Crown Copyright.)

9351 **(PB—83-261479) Observations on the aerial application of dispersant using dc-6b aircraft, Gulf of Campeche, Mexico.** Parker, H.D. (Warren Spring Lab., Stevenage (UK)). [nd]. 15p. NTIS, PC AE03/MF E03.

The work described in this report was sponsored by the Ship and Marine Technology Requirements Board. The report describes aerial application of dispersant to oil released by the blowout of the IXTOC offshore exploration well in the Gulf of Campeche. Operational aspects are discussed and estimates made for dispersant application rates. On the two sorties observed by WSL the dispersant was not seen to be fully effective and this was thought to be due to a combination of low application rates and the fact that the oil appeared to have formed a stable water-in-oil emulsion. (Copyright (c) Crown Copyright 1980.)

9352 **(PB—83-261487) Evaluation trials on equipment manufactured by OMI Ltd., Tonbridge, Kent. the oil mop II-9DP.** Thomas, D.H. (Warren Spring Lab., Stevenage (UK)). [nd]. 15p. NTIS, PC AE03/MF E03.

This oil recovery device, intended for use in sheltered inshore waters, was assessed on the ability of its endless oleophilic belt to remove a variety of oils from a fresh water test surface. The recovery rate and efficiency (relative to water pick-up) were examined as a function of mop speed and thickness of the oil layer to be recovered. Performance was dependent on oil density and thickness. A layer of diesel fuel oil 20 mm thick was recovered at 5.8 tons/h; Kuwait Crude Mousse at 6.2 tons/h. Recovery rates fell as the oil layer thickness decreased. The absorbent band could recover heavy fuel oil from the water surface but detachment of the collected oil at the recovery rollers was not possible without the application of steam heat. (Copyright (c) Crown Copyright 1978.)

9353 **(PB—83-262618) Criteria for the selection of oil spill containment and recovery equipment for use at sea.** Cormack, D. (Warren Spring Lab., Stevenage (UK)). [nd]. 11p. NTIS, PC AE03/MF E03.

The elements of the Warren Spring Laboratory research and development program on oil spill recovery at sea are set out, the range of skimmers and booms tested at sea is described and principles and criteria for selection presented against that background. It is then shown how these principles and criteria have been used to design and develop the Springsweep oil recovery system, details of which are presented as an example of the implementation of the principles and criteria. It is concluded that this approach can be used to give guidance in the selection of new projects for research and development support and to select equipment already available, for trials at sea. (Copyright (c) Crown Copyright 1979.)

9354 **(PB—83-264275) Investigation of the effects of oil viscosity and water-in-oil emulsion formation on dispersant efficiency.** Martinelli, F.N.; Cormack, D. (Warren Spring Lab., Stevenage (UK)). [nd]. 14p. NTIS, PC AE03/MF E03.

A simple revolving flask efficiency test has been used to determine the effect of weathering on the efficiency of concentrate dispersants, characterised by the increase in viscosity due to a. water-in-oil emulsion formation and b. evaporation of low molecular weight components. Results in each case indicate a rapid fall in efficiency between 1,000 and 10,000 cP, due to the mechanical difficulties in obtaining intimate mixing between the oil and dispersant. Higher efficiencies were obtained by using the dispersant undiluted rather than as a 10% dilution in seawater, with the differences becoming greater with increasing viscosity. The significance of these findings is discussed with reference to dispersant testing, spraying methods at sea and the introduction of an operation 'cut off point' for spraying, based on the viscosity of the spilled oil or emulsion. (Copyright (c) Crown Copyright 1979.)

0230 Properties

REFER ALSO TO CITATION(S) 9324

0250 Combustion

REFER ALSO TO CITATION(S) 10166

03 NATURAL GAS

REFER ALSO TO CITATION(S) 9218

9355 **(DOE/EIA—0440) Recent market activities of major interstate pipeline companies.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Jan 1984. 258p. NTIS, PC A12/MF A01 - GPO. Order Number DE84005340.

In addition to analyzing trends in wellhead purchases over the past year, this study also presents information and analysis of natural gas purchases from other pipeline companies, and sales to several types of customers. Activities of 20 major interstate pipeline companies were analysed in response to market developments over the past 4 years and over the past year in particular. This study includes an analysis of trends in natural gas sales and of the effects of increasing prices since 1979. It includes separate analyses of direct industrial sales, sales to major pipeline companies, and other sales for resale, as well as analyses of the volumes transported for sale to others. It also reports on purchase patterns in general since 1979 and on purchase projection patterns for particular types of gas since 1981. The differing behavior of pipeline companies in purchasing high-cost gas in the current market is also analyzed. (PSB)

9356 **Research and the consumer.** Lawrence, G.H. pp 37-42 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

An examination of the various energy options available to consumers reveals that natural gas has more to offer than the alternatives. Unlike other forms of energy, it is clean-burning, efficient, and widely available throughut the world. Therefore, it is incumbent upon the gas industry to continue to ensure that it provides consumers with the best possible service at the lowest possible cost. The key to the industry's ability to serve the consumer more economically is research. This paper examines the role of gas industry research as it relates to supply, transportation and utilization, safety, and environmental matters, and suggests that greater appreciation of consumers' concerns and needs will provide guidance in making research even more effective than it is today.

0302 Geology And Exploration

REFER ALSO TO CITATION(S) 9322, 9327, 9360, 9363, 9374

9357 Mineralogic and petrologic overview of core samples from the Dept. of Energy's western gas sands project multiwell experiment, Piceance Basin, Colorado. Eatough, M.O. (Bendix Field Eng. Corp.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11764**: 445-448(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

The Petrology Laboratory of Bendix Field Engineering Corporation (BFEC) at Grand Junction, Colorado, is performing mineralogic and petrologic analyses on core samples from the Multi-Well Experiment (MWX) project for Sandia National Laboratories. The samples studied to date include some fluvial sands, transitional sands, and shoreline blanket sands. The sands are generally fine-grained feldspar and lithic-rich quartz sandstones, with minimal textural and mineralogic variation. Porosity is predominantly microporosity in clays which fill secondary pore space. The primary factor limiting the permeability of these sands appears to be the clogging of the pore space by clay minerals.

9358 Deep earth gas. Gold, T. pp 1099-1110 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The great concentration of carbon at the surface of the earth is the result of upward migration of carbon-bearing gases from deep levels. The substances embedded in the mantle that are responsible are thought to be similar to primitive solar system materials and to the carbon-bearing meteorites, and such materials would outgas chiefly methane. Various chemical and biological processes then modify this upward stream; CO_2 will result from oxidation in hot rocks and from microbial action. Conversion to petroleum may occur by processes that are now beginning to be understood, and that have a significant biological component. The regional distribution of hydrocarbon deposits and the large-scale patterns of the trace elements they carry, such as helium, mercury, vanadium, nickel, etc., can be understood in this scheme. The frequent vertical stacking of hydrocarbon deposits, and their occurrence in tectonically determined locations, adds further evidence for this viewpoint. Deep gas can then be expected to be widespread and plentiful. 27 references.

9359 Methane hydrate gas production: evaluating and exploiting the solid gas resource. McGuire, P.L. (Los Alamos National Lab., NM). pp 566-568 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

0303 Drilling, Production, And Processing

REFER ALSO TO CITATION(S) 9327, 9328, 9329, 9368

9360 A new approach to air-hole interpretation in the Canyon Sands of Central Texas. Forest, R.P.; Diggons, W.F.; Grace, L.M. (Schlumberger Well Services). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11619**: 175-180(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

The Canyon Sands of Central Texas have been exploited by air-drilling techniques since the mid-1950's, and the activity level has increased because of tight gas prices and the prospect of eventual deregulation. This paper introduces a new approach to air-hole interpretation which combines old and new techniques and provides additional information for the exploitation of this area. The Canyon Sands are characterized by low permeabilities, high clay content, and small amounts of water production. Previous methods of evaluation include an FDC Density/CNL Neutron log and a Temperature survey. Advances have been made in establishing an accurate neutron porosity, and the addition of an induction log has allowed a Three-Perm Coriband log to be computed. The audio log is run in combination with the induction log to confirm temperature anomalies and to find previously overlooked gas entries. This suite of logs ensures better treatment and, therefore, greater production. Well stimulation and design are further enhanced by producibility logs. The overall air-hole package is the most up-to-date wireline method for the interpretation of air-drilled gas wells.

9361 Decline curve analysis in fractured low permeability gas wells in the Piceance Basin. Stright, D.H.; Gordon, J.I. (Reservoir Management Services). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11640**: 351-362(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

Production decline curves of three representative low permeability gas wells in the Piceance Basin are analyzed. These wells produce from the Mancos "B", Mesaverde and Wasatch formations, respectively. It was found that long term production in these wells could be approximated using linear flow equations. This observation leads to the development of a decline curved method for predicting rate-time behavior based only on one or two years of production data. The method is easy to apply and requires only data which is routinely reported to state oil and gas regulatory agencies. This type of data is public information and is readily available in most states. The observed long-term linear flow behavior indicates that fracture lengths are much longer than would be expected from hydraulic fracturing treatments. Possible explanations for this behavior are discussed. The possibility of using short-term test data to define the long-term production decline curve is also discussed.

9362 Use of foaming agents to alleviate liquid loading in Greater Green River TFG wells. Vosika, J.L. (Amoco Production Co.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11644**: 377-386(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

Downtime and decreased production due to liquid accumulation in the wellbore are common problems among low volume tight formation gas wells. Recently, foaming agent injection was initiated in several Greater Green River Basin area wells as a low cost method to combat liquid loading problems. This paper illustrates that the use of foaming agents has proven to be an inexpensive yet effective solution to liquid loading problems in area gas wells.

9363 Multi-well experiment: a field laboratory for tight gas sands. Northrop, D.A.; Sattler, A.R.; Westhusing, J.K. (Sandia Natl. Lab.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11646**: 393-398(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

The Multi-Well Experiment (MWX) is a research oriented field laboratory whose objective is to develop the understanding and technology to allow economic production of the several years supply of natural gas estimated to be within the low permeability, lenticular gas sands of the Western United States. Features of MWX include: close-spaced wells (about 125 ft, about 38 m) for reservoir characterization, interference testing, well-to-well geophysical profiling, and placement of diagnostic instrumentation adjacent to the fracture treatment; complete core taken through the formations of interest; a comprehensive core analysis program; an extensive logging program with conventional and experimental logs; determination of in situ stresses in sands and bounding shales; use of various seismic surveys and sedimentological analyses to determine lens morphology and extent; use of seismic, electrical po-

tential and tilt diagnostic techniques for hydraulic fracture characterization; and a series of stimulation experiments addressing key questions. This paper presents the current MWX accomplishments in the above areas since drilling started at the site in September 1981 through December 1982.

9364 **Factors which can reduce the olfactory response to natural gas odorants.** Moschandreas, D.J.; Jones, D.R.; Altpeter, L.L. pp 162-171 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Nine odorants commonly used by the gas industry were characterized in an interference-free environment. Fatigue to odorous air was assessed by monitoring odorant intensity and quality by occupants of and visitors to an odor chamber, simulating conditions found in a room with a gas leak. Chamber experiments were performed to assess fatigue to exposure to constant levels of odorants. Chamber experiments were implemented to estimate levels necessary to warn randomly selected panelists of a potential gas leak. The impact of stimuli other than odor on the ability of the panelists to perceive odor was assessed in a field study involving about 2000 subjects. Synthesis of the generated data base in conjunction with current industry odorization practices indicates that the maximum odorant levels used merit consideration for all the future odorization activities. 13 references, 4 figures, 5 tables.

9365 **Odor and odorization: relationship between complaints and odorant concentrations - a study in the field.** Coquand, J.P.; Walaine, P. (C.E.R.I.G., Saint-Denis, France). pp 172-180 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

This paper reviews a study initiated in August 1980, the object of which is to explain the variations in complaints concerning the odor of gas by gas distribution and meteorological variables. The results obtained show that these variations are mainly random, however, once the degree of randomness is reduced, there is a good correlation between the level of complaints and the mercaptan concentration in the gas. The role of THT and its equivalence to mercaptan is explained. A methodology is suggested for the study of other gas undertakings. 3 references, 4 figures, 8 tables.

9366 **Fractured shale gas reservoir performance study--An offset well interference field test.** Frohne, K.H.; Mercer, J.C. (U.S. DOE). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* SPE11224: 1-14(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

Gas production characteristics of naturally fractured Devonian shale have been quantified through a three-well interference test using an established producing well and two offsets placed on the primary and secondary regional fracture trends relative to the producer. Three individual shale zones were tested simultaneously by buildup, drawdown, and pulse tests to investigate reservoir gas flow characteristics, natural fracture properties, and gas storage and release mechanisms. Test results show severe permeability anisotropy, indicating elliptical drainage pattern with an 8:1 axis ratio. Essentially all gas is stored in a sorbed state in the shale matrix and is transported toward the wells through the native fracture system.

9367 **The effect of stress-dependent permeability on gas production and well testing.** Ostensen, R.W. (Sandia National Laboratories). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* SPE11220: 1-13(Sep 1982). (CONF-820927—). Contract AC04-76DP00789.

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

The effect of stress-dependent permeability on gas production and well testing in tight gas sands was studied by using a modified pseudopressure that included the stress dependence. This work assumes that information on cores is applicable to reservoir behavior. Since microcracks are the primary path for flow through tight gas sand cores, average stress-dependent permeabilities were found as an average over all crack orientations in a nonuniform stress field, with a horizontal stress only 0.6 times the vertical one. Initial in-situ permeabilities are found to be 2 to 5 times the values obtained from uniformly restressed cores. Stress dependence decreases initial gas production by roughly 30% with the loss increasing with reservoir depletion. Buildup tests yield reliable results for the properties at average reservoir pressure. Drawdown tests are more sensitive to stress effects and are much less reliable.

0305 Health And Safety

REFER ALSO TO CITATION(S) 9364, 9365, 10336

9368 **Risk-benefit analysis of improved gas odorants.** Larocque, G.R.; Kalelkar, A.S. (Arthur D. Little, Inc., Cambridge, MA). pp 181-192 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

An analysis was conducted to quantify risks of fatal natural gas distribution incidents in the United States and an assessment made of the potential benefits (risk reduction) achievable through use of new gas odorants with improved resistance to pipeline fading and odorant loss upon soil contact. The analysis of risk and benefit was based on historical data for the years 1970 to 1978 obtained from the US Department of Transportation leak report files. The analysis was augmented by the use of a fault tree analysis to estimate possible odorant involvement in distribution incidents. The risk analysis indicated that even under a number of conservative assumptions, the risks due to gas distribution activities are far smaller than many other common human activities and also smaller than risks associated with natural disasters. It was also shown that benefits derived from improvements in gas odorants could only lead to marginal reduction in the risk of fatal incidents. 3 references, 2 figures, 3 tables.

0306 Marketing And Economics

REFER ALSO TO CITATION(S) 9327, 9335, 9340, 9380, 9383

9369 **(DOE/EIA—0130(83/12[1])) Natural gas monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). Dec 1983. 207p. NTIS, PC A10/MF A01 - GPO. Order Number DE84004749.

Wet marketed production of natural gas during October 1983 was estimated at 1440 billion cubic feet (Bcf), 1.4% below the October 1982 level. Dry gas production was estimated at 1381 Bcf, 1.4% below October 1982 level. Consumption during October 1983 was an estimated 1289 Bcf, decrease 1.7% compared to October 1982. Residential consumption was down 8.8%, commercial consumption down 1.9%, and industrial consumption down 1.5%. Electric utility consumption was 2.0% above September 1982 consumption. The volume of working gas in underground storage reservoirs at the end of October 1983 was 2.8% below the October 1982 level. The average wellhead price of natural gas in August 1983 was $2.59 per thousand cubic feet (Mcf). In August 1982 the average was $2.53 per Mcf. In October 1983, the city average residential price for 100 therms of natural gas was $64.06 compared to $59.58 in October 1982. The average wellhead first sale price for natural gas purchases projected for November 1983 was $2.78 Mcf. In November 1982 the average price was $2.68 per Mcf. The average price projected for Old Gas in November 1983 was $1.43 per Mcf, for New Gas, $3.49 per MCF, and for High Cost Gas $5.55 per MCF. In November 1982 the prices projected for Old Gas, New Gas, and High Cost Gas averaged $1.38, $3.30, and $7.20 per Mcf, respectively. A selected group of natural gas companies estimated that 2.0 trillion cubic feet of surplus deliverability was avail-

able for offsystem sales during the six-month period October 1983 through March 1984.

9370 An analysis of industrial demand for natural gas. Reister, D.B. (Institute for Energy Analysis, Oak Ridge Associated Universities, Oak Ridge, TN). *Energy (Oxford);* 8: No. 10, 749-756(Oct 1983). Contract AC05-76OR00033.

Several analysts have proposed the theory that there is a frustrated demand for natural gas in the United States. According to this theory, the natural gas curtailments of the 1970s have convinced industrial users that natural gas is not reliably available. The users are willing to buy fuel oil at a premium and store it to assure a reliable energy supply. If this theory is correct, as the supply of natural gas becomes more reliable, natural gas should be able to recapture the market share it lost to fuel oil. To investigate this theory, a state-level data base on demand for fuel oil and natural gas by all manufacturing sectors for 1971 and 1974 to 1979 was developed. Then a model was developed to explain manufacturers' demand for fuel oil and natural gas during this period on the basis of fuel price and the availability of natural gas. Rather than a frustrated demand for natural gas, the authors find an excess demand for natural gas in several states. Fuel oil may be able to capture the market from natural gas in these states.

9371 Gas technology base needs in an era of growing energy service competition. Linden, H.R. pp 43-50 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The impact of increasing competition in the energy market on the outlook for gas demand is discussed, with special reference to the prospects for stable and even declining world oil prices. Although the fundamentals of energy service economics favor gas over electricity and liquid fuels over the long run, at least for the remainder of the decade and, perhaps the century, accelerated development and commercialization of new or improved supply and end-use technologies will be necessary to maintain the competitive edge of gas at the burnertip. The objective of gas R and D must be to increase the margin between the acquisition cost of gas and its form value to end users. Greatly increased end-use efficiency of gas appliances and equipment at first-cost premiums with short payback times is, therefore, an essential component of a sound gas marketing strategy, as is the development and commercialization of new uses in which gas can deliver competitive energy services. Equally important is the development of new sources of supply at marginal costs that keep the delivered price of gas below market-clearing levels. In the United States, improved recovery techniques for the huge resources of natural gas contained in tight geologic formations offer such an option. Improved reliability, safety and economy of gas service can also make significant contributions to the continued competitiveness of gas. Several principles for enhancing the probability of technical and commercial success of institutional R and D are presented, along with examples of successful gas R and D projects managed in accordance with these principles.

9372 Gas technology products: from research to successful market introduction. Bernstein, H.M. (Applied Management Sciences, Silver Spring, MD); Shikari, Y.A. pp 1111-1120 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Historical development of several illustrative heat engines is reviewed within the context of a technology development process. Several common technology and business-related factors affecting the successful development and introduction of a new technology into the marketplace are briefly analyzed. Estimates are also provided for the R and D and tooling costs, as well as the time needed to reach a mature production stage. The insights gained during the study should prove to be extremely useful to those involved in the research and development of new or refined gas technology products. An understanding of the R and D process is presented for a generic industry, component manufacturers, system manufacturers, and research and development organizations. Though the discussion is directed to the HVAC market, the results of the study can be applied directly to the introduction of any new or refined product into a highly structured, competitive marketplace.

0308 Environmental Effects

9373 (UCID—19953-Vol.1) Coyote series data report LLNL/NWC 1981 LNG spill tests dispersion, vapor burn, and rapid-phase-transition. Volume 1. Goldwire, H.C. Jr.; Rodean, H.C.; Cederwall, R.T.; Kansa, E.J.; Koopman, R.P.; McClure, J.W.; McRae, T.G.; Morris, L.K.; Kamppinen, L.; Kiefer, R.D. (Lawrence Livermore National Lab., CA (USA)). Oct 1983. Contract W-7405-ENG-48. 155p. NTIS, PC A08/MF A01. Order Number DE84005138.

The Coyote series of liquefied natural gas (LNG) spill experiments was performed at the Naval Weapons Center (NWC), China Lake, California, during the summer and fall of 1981. These tests were a joint effort of the Lawrence Livermore National Laboratory (LLNL) and the NWC and were sponsored by the US Department of Energy (DOE) and the Gas Research Institute. There were ten Coyote experiments, five primarily for the study of vapor dispersion and burning vapor clouds, and five for investigating the occurrence of rapid-phase-transition (RPT) explosions. Each of the last four of the five RPT tests consisted of a series of three spills. Seven experiments were with LNG, two were with liquid methane (LCH_4), and one was with liquid nitrogen (LN_2). Three arrays of instrumentation were deployed. An array of RPT diagnostic instruments was concentrated at the spill pond and was operated during all of the tests, vapor burn as well as RPT. The wind-field array was operated during the last nine experiments to define the wind direction and speed in the area upwind and downwind of the spill pond. The gas-dispersion array was deployed mostly downwind of the spill pond to measure gas concentration, humidity, temperature, ground heat flux, infrared (IR) radiation, and flame-front passage during three of the vapor dispersion and burn experiments (Coyotes 3, 5, and 6). High-speed color motion pictures were taken during every test, and IR imagery (side and overhead) was obtained during some vapor-burn experiments. Data was obtained by radiometers during Coyotes 3, 6, and 7. This report presents a comprehensive selection of the data obtained. It does not include any data analysis except that required to determine the test conditions and the reliability of the data. Data analysis is to be reported in other publications. 19 references, 76 figures, 13 tables.

0309 Artificial Stimulation

REFER ALSO TO CITATION(S) 9324, 9359

9374 (DOE/BETC/TPR—83/1) Western Gas Sands Subprogram. Status report, October-November-December 1982. Crawley, A. (comp.). (Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center). Dec 1983. 87p. NTIS, PC A05/MF A01. Order Number DE84005117.

The progress during October, November and December 1982 of government-sponsored projects to increase gas production from low permeability gas sands of the Western United States, is summarized in this edition of the Western Gas Sands Subprogram (WGSS) Quarterly Status Report. During the quarter, major changes were made in the management of the subprogram. Personnel in the Division of Petroleum Projects Management at the Morgantown Energy Technology Center (METC) assumed the role of management for the Western Gas Sands Subprogram that had been performed by the Bartlesville Energy Technology Center (BETC). BETC continued in-house research on the fluid and proppant problems of fracture conductivity, and management of the Multi-Well Experiment (MWX). Owing to economic constraints, all efforts at the Sandia National Laboratory that were not directly related to the performance of MWX were terminated. The projects at the Lawrence Livermore National Laboratory and the Los Alamos National Laboratory were reduced by approximately 50 percent. The efforts at the USGS were reduced by 70 percent. Significant progress was made in the MWX project. Both the Upper and Lower

Cozzette zones were production tested. Interference tests run on the Upper Cozzette showed much higher in situ permeability than core and log analysis indicated. This higher permeability has been attributed to the natural fractures. The site was closed for the winter on December 22 and the test trailer moved to CER Corporation, Las Vegas, for maintenance and upgrading. 40 figures, 16 tables.

9375 **A case study of the Wilcox (Lobo) trend in Webb and Zapata counties, Texas.** Robinson, B.M.; Holditch, S.A.; Lee, W.J. (S.A. Holditch and Assocs.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11600**: 17-28(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

The Wilcox (Lobo) trend of Webb and Zapata Counties, Texas is a series of geopressured, low permeability sands in which the average depth ranges from 5,000 to 12,000 feet (1525 to 3660 m). Over 700 wells have been drilled in this prolific trend over the last 8 to 10 years. Although actively developed during this time period, this trend has become even more attractive due to its recent classification by the Federal Energy Regulatory Commission (FERC) as a "tight" gas formation. In essence, development of the Wilcox (Lobo) has been successful due to advances in modern technology. This paper presents the results of several years of study involving the geologic history, completion methods, massive hydraulic fracture stimulation treatments, reservoir evaluation, and numerical analysis of hydraulically fractured wells in this trend, all of which illustrate the application of this modern technology.

9376 **Evaluation of stimulation treatments in Appalachian tight gas sands.** Charles, J.G.; Hall, D.R.; Hudock, K.D.; Udick, T.H. (Dowell Division of Dow Chemical). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11601**: 29-40(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

This paper attempts to evaluate fracture design in relation to tight gas sands in the northeastern United States. A review of the major variables affecting hydraulic fracture design is included and a discussion of three pressure transient methods used in the evaluation is presented. Pressure buildup analysis was used to determine effective reservoir permeability and pressure. Type curve matching was used to approximate fracture lengths and to predict production resulting from changes in fracture geometry. Computer reservoir simulation analysis helped in more accurately modeling the reservoir to support the production forecasting. A case history detailing this method of evaluation in the Medina Formation is discussed. Actual field data are compared to the predicted results. A field study is also presented which deals with the "Clinton" formations in Ohio. A number of wells were evaluated (after stimulation) with type curves and some ideas on job designs are suggested.

9377 **The Mancos Formation: an evaluation of the interaction of geological conditions, treatment characteristics and production.** McLennan, J.D.; Marx, W.P.; Roegiers, J.C. (Dowell Div. of Dow Chemical). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11606**: 63-72(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

In general, the Mancos Formation is an underpressured sequence composed of intimately interbedded siltstones and shales in a relatively faulted geologic environment. Apparently sporadic production trends from the Mancos Formation in northwestern Colorado led to an intensive evaluation program. This encompassed laboratory determination of the mechanical and fluid transport properties of the formation as well as evaluation of treatment and production records. Production trends were compared with known geological conditions as well as stimulation procedures. Mechanisms for the variability in production and the local effectiveness of treatments are outlined. General procedural approaches for optimum recovery are discussed. These procedures include resource determination guidelines and general stimulation guidelines.

9378 **Determination of in-situ stress from anelastic strain recovery measurements of oriented core.** Teufel, L.W. (Sandia National Lab.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11649**: 421-430(Mar 1983). (CONF-830305—). Contract AC04-76DP00789.

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

A reliable method for determining the in situ stress state in deep formations is of great importance to the gas industry in designing massive hydraulic fracture treatments of low permeability reservoirs. Knowledge of the horizontal in situ stress directions and magnitudes would allow prediction of fracture azimuth and height. In this paper a method using anelastic strain recovery measurements of oriented core will be presented as a reliable and practical tool for determining both the directions and magnitudes of the principal horizontal in situ stresses in deep formations. The principal horizontal stress directions are determined directly from the principal horizontal strain recovery directions. The principal horizontal stress magnitudes are calculated from the principal strain recovery magnitudes, overburden stress, and Poisson's ratio of the rock using a viscoelastic model by Blanton. In addition, petrophysical measurements of the core parallel to the principal directions of strain recovery, at atmospheric pressure and at elevated confining pressure, suggest that the strain recovery process is a consequence of microcrack formation and expansion.

9379 **A comprehensive fracture diagnostics instrumentation fielding program.** Hart, C.M.; Engi, D.; Morris, H.E. (Sandia Natl. Lab.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE11810**: 461-468(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

Economic development of low permeability gas reservoirs often necessitates the use of massive hydraulic fracturing. Assessment of the effectiveness of the induced fracture requires knowledge of the dimensions, orientation, and spatial characteristics of the fracture in relation to the gas-bearing formation. A comprehensive characterization of fracture propagation not only aids in fracture treatment design for the reservoir, but can also help specify well spacings which will minimize interference of drainage patterns and thus maximize economic-recovery potential. This paper presents an approach to the development of a comprehensive fracture diagnostics program. The fracture diagnostics subprogram for the Multi-Well Stimulation Experiment I is discussed in detail, including fielding descriptions and operational procedures. Synopses of measurement techniques are given with emphasis on the fracture parameters one would expect to estimate from the individual instrumentation systems.

9380 **Unconventional gas: recent R and D advances.** Kuuskraa, V.A.; Komar, C.A. pp 1136-1146 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Since the mid-1970's, substantial research and development has been focused on unconventional gas. While there are still many unknowns, significant strides have been made in developing the following four unconventional gas resources: Devonian shale, coalbeds, tight sands, and geopressured aquifers. This paper examines four areas where research had added information that could be valuable to developers of natural gas, namely: (a) Identification of Geologically Favorable Areas; (b) Enhanced Capability in Well Completion, Stimulation and Gas Production; (c) Improved Estimates of Investment and Operating Costs; and (d) Anticipated Return to Investors. 8 figures, 2 tables.

9381 The Department of Energy's western gas sands project multiwell experiment update. Northrop, D.A.; Crawley, A.B.; Sattler, A.R. (Sandia National Laboratories). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11183**: 1-8(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

The Department of Energy has initiated a Multiwell Experiment with these objectives: characterization of low permeability, lenticular gas sands and evaluation of state-of-the-art and developing technology for their production. The location is in the Rulison Field in the Piceance Basin, Garfield County, Colorado where the lenticular Mesaverde sequence and the underlying blanket Corcoran-Cozzette are the formations of interest and lie at depths between 4,000 and 8,600 ft. Features of this research-oriented field experiment include: three close-spaced wells (100 to 500 ft) for reservoir characterization, conventional well tests, interference testing, well-to-well geophysical profiling, and placement of diagnostic instrumentation adjacent to fracture treatments; complete core taken through the formations of interest; a comprehensive core analysis program; an extensive logging program featuring conventional and experimental logs; determination of in situ stress in sand lenses and bounding shales; application of geophysical techniques to determine sand lens orientation; use of seismic, electrical potential and tilt diagnostic methods for hydraulic fracture characterization; and a series of stimulation experiments. This paper is a survey of the findings to date. It includes a discussion of a study of the most relative outcrops; the drilling program; core analysis; and well-to-well correlation of the geology.

9382 State of the art hydraulic fracture stimulation treatment for a western tight sand reservoir. Ahmed, U.; Greenfield, H.; Holland, M.T.; Jones, A.H.; Schatz, J.F. (Terra Tek Inc.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11184**: 1-15(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

The Pinedale gas field is a tight sand reservoir in Sublette County, Wyoming. A number of wells have been drilled in this field since the 1930's. However, there has been no commercial production because of low initial flow rates and rapid production declines usually associated with low permeability. This field would become attractive if the technological problems impairing development could be overcome. This paper describes a resource evaluation and stimulation research program centered around the drilling of two new wells in the Pinedale Field. The resource evaluation involved a critical review of prior data, geological and geophysical work, laboratory testing of core samples from the new wells, and pre-stimulation and post-stimulation flow testing of the new wells. The stimulation research involved special core testing with candidate stimulation fluids and proppants, field in-situ stress testing for fracture geometry estimates, transient pressure testing for well and fracture evaluation, hydraulic fracture design and implementation, and well deliverability projection. Utilizing the state-of-the-art technology, a total recoverable reserve of 2.8 tcf is now possible from the 90,000 acres of Pinedale Field.

0320 Transport, Pipelines, And Handling

REFER ALSO TO CITATION(S) 10287

9383 (DOE/EIA—0145(82)) Statistics of interstate natural gas pipeline companies, 1982. Mack, J. (USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas). 23 Dec 1983. 384p. NTIS, PC A17/MF A01. Order Number DE84004670.

Portions are illegible in microfiche products.

The 1982 financial and operating information presented in this report indicates that the 97 Class A and B interstate natural gas pipeline companies reported assets totaling $64.9 billion, as of December 31, 1982, compared with $58.3 billion on December 31, 1981. Gross gas utility plant investments at the end of the year amounted to $44.1 billion ($40.1 billion); and net gas utility plant assets amounted to $24.2 billion ($21.8 billion). The Class A and B pipeline companies reported total gas operating revenues of $64.2 billion, reflecting the effects of inflation and higher purchased gas costs. Sales of natural gas decreased from 17.8 trillion cubic feet in 1981 to 16.2 trillion cubic feet in 1982. Sales of natural gas to ultimate consumers decreased from 3.3 trillion cubic feet in 1981 to 2.8 trillion cubic feet in 1982. Sales to other gas utilities decreased from 14.5 trillion cubic feet in 1981 to 13.3 trillion cubic feet in 1982. Revenues from these sales to ultimate consumers amounted to $11.2 billion in 1981 and $12.0 billion in 1982. Revenues from sales for resale to other gas utilities amounted to $49.4 billion in 1982 and $42.1 billion in 1981. The total number of natural gas customers was 6,669,932 in 1982, compared with 6,429,447 in 1981. Of these, ultimate consumers totaled 6,666,947 (6,426,546) and 2985 (2901) wholesale gas utility customers. The collection of financial and operating statistics on the natural gas industry reported here is limited under the Natural Gas Act to that segment of the industry subject to the FERC's regulatory jurisdiction. Thus, the collected statistics represent less than full industry coverage.

9384 (DOE/ET/26210—T1) Study of the behavior of gas distribution equipment in hydrogen service. Phase II. Project 65022 final report, April 26, 1979-June 26, 1980. Jasionowski, W.J.; Huang, H.D. (Institute of Gas Technology, Chicago, IL (USA)). Jul 1980. Contract AC02-76ET26210. 82p. NTIS, PC A05/MF A01. Order Number DE84005398.

The hydrogen permeability of three different types of commercially available polyethylene natural gas pipe was determined. The collected data show that the polyethylene pipe is 5 to 6 times more permeable to hydrogen than to methane. Ring tensile tests were conducted on permeability-exposed and as-received samples. Comparisons of apparent strength between exposed and as-received specimens show little difference of any statistical significance. Ring tensile tests of exposed pipe samples, after testing to failure, show more elongation than as-received samples. Hydrogen-methane gas leakage experiments were conducted. The results show there is no selective leakage of hydrogen via Poiseuille, turbulent or orifice flow (through leaks) during the distribution of blends of hydrogen and methane. The leak rates increase with increasing pressure and decreasing specific gravity. Analytical studies show that approximately 13.7 x 10^6 SCF of natural gas are lost annually by permeation in the 154,000 miles of installed plastic pipe in the US; if hydrogen were distributed, 67.4 x 10^6 SCF would be lost. The unaccounted-for gas loss in the US is about 236 x 10^9 SCF annually; if hydrogen were distributed, the unaccounted-for gas loss could be 693 x 10^9 SCF. Permeation losses are less than 0.02% of the unaccounted-for gas losses. 13 references, 23 figures, 14 tables.

9385 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). 1174p. (In English and French). (CONF-830664—). Government Institutes, Inc., 966 Hungerford Drive, No. 24, Rockville, MD 20850.

From International gas research conference; London, UK (13 Jun 1983).

The 1983 International Gas Research Conference (IGRC) was held in London, United Kingdom, and thus became the first conference in this successful series to to held outside the United States. The series, which began in Chicago, Illinois, in 1980 with some 30 papers has grown to this year's presentation of 100 papers. The technical papers were grouped under the following session headings: (1) distribution and transmission (controls safety, gas distribution operation, metering, odorants, plastic piping, steel pipe and coatings); (2) substitute natural gas (biomass, gasification processes, materials, methanation, underground gasification; (3) residential and commercial utilization (heat pumps, space heating and boilers, systems, water heating); (4) industrial utilization (combustion systems, furnace and heaters, industrial energy systems); and (5) thermophysical properties and processes (fluid properties, combustion). All papers have been abstracted and indexed for the Energy Data Base.

9386 **Introduction of fault tolerance into digitally controlled gas regulators.** Preece, C.; Pearson, J.; Halse, R. (Univ. of Durham, England). pp 64-73 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Microelectronics can increase the security of gas supply because of the high reliability of modern electronic components. Digital microprocessor design can provide controllers for gas governors which give a high degree of flexibility for control and monitoring purposes. A digital controller is described in which techniques of Fault Tolerance in the hardware and the software further enhance reliability. A structured approach to the design is proposed, and methods of testing and verifying the predicted coverage for the fault recovery routines are outlined. 7 figures.

9387 **Simulation in the design of gas pressure control equipment.** Stoves, D.; Thompson, B.; Graham, P. pp 74-86 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The design and development of pressure regulating equipment for use in complex supply networks requires the specification of steady state and dynamic performance criteria which will ensure security of supply and stable operation within acceptable limits. It was recognized that simulation could provide a significant contribution in addition to reducing development time and costs. To investigate the effects of changes in significant parameters a detailed regulator model was established. The modelling of a supply network posed particular problems due to the large variation in actual pipework arrangements. Acoustic analysis was used to identify a representative characterization of a network. This paper indicates how computer simulation can be used to first establish appropriate response criteria and then aid the design of a regulator to satisfy these criteria. 7 references, 7 figures.

9388 **Influence of mechanical damage on transmission pipeline integrity.** Jones, D.G.; Hopkins, P. (British Gas Corp., Newcastle upon Tyne, England). pp 106-115 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

This paper describes the extensive British Gas research on the effect of mechanical damage on pipeline integrity. The research has isolated the major factors which contribute to failure, namely: cracking, denting, pipe toughness and sustained and cyclic presurization. The practical significance of these factors is quantified. The quantification of the factors which contribute to failure can be used as a basis for defining inspection procedures to allow the sentencing and repair of mechanical damage while the pipeline is in service. 6 references, 5 figures, 2 tables.

9389 **Inspection and tuning of reciprocating engines.** Klimstra, J. pp 116-126 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Investigations have been carried out on the optimization of large gas engines driving reciprocating compressors. Modern digital instrumentation was applied for data acquisition. Results showed possibilities for improvement of control systems and setting for e.g., valve timing, ignition timing and air to fuel ratio. The apparent heat release functions provided valuable information with respect to combustion phasing, duration and knock. A cylinder process model was developed for evaluating tuning criteria. This model revealed that efficiency was not affected by cyclic dispersion at optimum ignition settings. Final results indicate about 3% reduction in fuel consumption much reduced breakdown and improved basis understanding of engine processes with respect to the original situation. 3 references, 8 figures.

9390 **Buckling and eccentricity effects on orifice metering accuracy.** Norman, R.; Rawat, M.S.; Jepson, P. pp 128-138 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Two important geometrical requirements for orifice plate measurements are examined. From a theoretical standpoint, the flowmetering errors arising from elastic deflection of a plate are quantified and equations derived which can be used to choose correct thicknesses of plates to minimize these errors and avoid plastic buckling. Various authors have derived different expressions for metering error and the reasons for these differences are explained. The present limit on plate flatness in both ISO 5167 and AGA 3 is shown to be inadequate and to lead to systematic measurement errors of up to 0.2%. An experimental investigation into the effect of plate eccentricity on the accuracy of measurement is reported. Present limits in ISO 5167 are extremely difficult to meet except in specialist laboratories. Air flow tests on five plates ranging from 0.75 β ratio to 0.2 β ratio in a 150 mm line show that these new concentricity limits can be substantially relaxed if an increase in uncertainty of 0.1% can be tolerated. 8 references, 7 figures.

9391 **Development of a multipath ultrasonic flowmeter for the measurement of high pressure gas flows.** Nolan, M.E.; O'Hair, J.G. (British Gas Corp., London, England). pp 139-149 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

In this paper we describe and explain the design of a prototype ultrasonic flowmeter for use in the British Gas Industry. We also describe the test results which show that the meter is accurate to +-1% absolute even when installed with a short meter run. The plans for the future development of the meter are discussed and its main advantages are indicated. 3 references, 6 figures.

9392 **Gas orifice meter performance with new mass flow reference system.** Mann, D.B.; Brennan, J.A.; Sindt, C.F.; LaBrecque, J.F.; Kneebone, C.H. (National Bureau of Standards, Boulder, CO). pp 150-160 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Performance data for several gas orifice meter runs and plates have been generated under a US gas industry supported program. The data have been developed using a unique NBS gas flow measurement facility capable of directly measuring the mass of gas metered by the orifice device. Direct comparison of predictions from empirical mathematical models can now be made at orifice bore Reynolds Numbers near four million. Orifice meter and flow reference system data are used to calculate discharge and expansion coefficients which in turn are compared to those derived from existing mathematical models. Orifice meter performance data, comparisons with existing models and system descriptions are provided. 8 references, 9 figures, 1 table.

9393 **Analytical prediction of crack growth in polyethylene pipes.** Papaspyropoulos, V.; Hulbert, L.E. (Battelle Columbus Labs., OH). pp 194-204 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

In its short history, polyethylene gas distribution piping has compiled an enviable safety record. However, the goal of piping system designers is to achieve safe operation for 50 years or more. To ensure structural integrity of plastic gas distribution piping throughout its life and to establish non-destructive inspection intervals, it is necessary to understand and predict how an existing flaw in the pipe would behave over an extended period of time. While accelerated testing techniques can be used to assess certain specific situations, for a general predictive capability an analytical model is

necessary. The work presented in this paper is aimed at developing such a capability. Using a fracture mechanics approach, the method is based on the colinear strip zone model in conjunction with finite element analysis. 24 references, 7 figures.

9394 **Finite element analysis of stress concentration effects in plastic pipelines.** Ghadiali, N.D.; Hulbert, L.E. (Battelle Columbus Labs., OH). pp 205-213 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The finite element method has been intensively developed in the last twenty years and applied to the study of the mechanical behavior of a great variety of complex structures. It is now commonly used for structural design and analysis. This paper presents the results of the finite element analysis of stress concentrations in three critical applications in polyethylene gas distribution pipelines. These applications included pipes with heat fused socket joints, pipes with butt fusion joints, and pipe subjected to an impinging rock. The obtained results showed that the finite element method can be used for studying the structural behavior of plastic gas distribution piping and for quantifying the stress raising effects in various piping system components. When properly applied, the finite element method could lead to improved fitting design and installation practices. 9 figures, 1 table.

9395 **Influence of morphology and molecular weight on ductile-brittle transitions in polyethylene.** Brown, N. (Univ. of Pennsylvania, Philadelphia); Kamei, E.; Ward, I.M. pp 214-223 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The tensile properties of polyethylene pipe materials were compared with the behavior of various other types of polyethylene over a wide temperature range. The samples of polyethylene varied in molecular structure, molecular weight and morphology. The different molecular structures involved differences in branching and the morphologies were varied by the crystallization conditions. The temperature of the ductile-brittle transition was greatly different among the samples. Low molecular weight slow cooled linear polyethylene exhibited particularly poor behavior having the highest brittle-ductile transition temperature and lowest brittle fracture stress and in addition it exhibited an unusual ductile-brittle transition around room temperature. In general, increasing molecular weight and rapid cooling from the melt produces better brittle-ductile behavior because there is an increase in the number of tie molecules. The tensile strength and fracture strain of low molecular weight slow cooled polyethylene was most sensitive to notches. The differences between polyethylenes were also displayed by observing the microscopic processes of deformation and fracture at the root of a notch. 6 references, 8 figures, 2 tables.

9396 **Propagating fracture in plastics pipelines.** Wolters, M.; Ketel, G. (VEG-Gasinstituut n.v., Apeldoorn, Netherlands). pp 224-234 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The modified Robertson test, a fracture propagation test for plastics pipes, has been evaluated in this paper by means of crack length, crack speed and decompression speed measurements. Materials with a different fracture progagation resistance can be clearly distinguished in this test. However, the internal pressure beyond which fracture propagation will occur in buried polyethylene pipelines cannot be established by the modified Robertson test used without a pressure reservoir. For a certain polyethylene (PE) type fracture propagation in the modified Robertson test has been observed beyond a pressure of about 3 bar. The axial speed of this running crack was about 150 m/s and independent of pressure. For another PE type only crack arrest has been found up to pressures of 10 bar. 6 references, 5 figures.

9397 **Rapid crack propagation in polyethylene pipes.** Prabhat, K. (Battelle Columbus Labs., OH); Maxey, W.A.; Hulbert, L.E.; Mamoun, M.M. pp 235-243 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

This paper describes the use of a linear elastic fracture mechanics (LEFM) model to study rapid crack propagation (RCP) behavior of polyethylene (PE) pipes. Full-scale fracture tests were conducted on 152-, 203-, and 305-mm (6-, 8-, and 12-inch) diameter PE 2306 and PE 3408 pipes at internal pressures of 3.5 to 14 bars (50 to 200 psi) and in the temperature range of -12 to 27°C (10 to 80°F). It was found that susceptibility to RCP increased with larger diameters, higher pressures and lower temperatures. Dynamic modulus and impact energy density were measured for the pipe material as a function of temperature. A preliminary study of the fracture surface of an RCP laboratory failure was also made using scanning electron microscopy. 6 references, 5 figures, 2 tables.

9398 **Slow crack growth in plastic pipes - characterization and applications.** Uralil, F.S. (Battelle Columbus Labs., OH); Markham, R.L.; Mamoun, M.M. pp 244-252 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A simple but useful method for evaluating the slow crack growth resistance of commercially available polyethylene gas piping materials is described. A notched C-shaped piece of pipe is loaded in a three-point bending mode for a known time interval and the crack growth is measured. Using linear elastic fracture mechanics (LEFM) principles, the stress intensity factor (K) at the tip of the notch is computed. Typical test results and microphotographs of fracture surfaces are presented. Use of a critical stress intensity factor (K/sub c/) to characterize the crack growth resistance of piping materials, the effect of test temperature, as well as the key assumptions and limitations are also discussed. 4 references, 10 figures.

9399 **Delamination of a fusion bonded epoxy coating from cathodically protected mild steel.** Watts, J.F.; Castle, J.E. (Univ. of Surrey, Guildford, England). pp 262-273 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Cathodic disbondment of a commercial epoxy coating has been investigated from both a mechanistic and a kinetic standpoint. X-ray photoelectron spectroscopy shows the failure mode to be invariant with surface pretreatment and predominantly adhesive in nature. The substrate surface profile does, however, determine the rate of disbondment; a simple relationship is presented to describe the disbondment rate in terms of interfacial path length. The concept of a critical disbondment velocity for the epoxy/mild steel system is proposed. It is shown that oxide reduction is an important pre-cursor to cathodic disbondment for this system. 8 figures, 3 tables.

9400 **Fundamental processes of cathodically protecting steel pipelines.** Thompson, N.G.; Barlo, T.J. (Battelle Columbus Labs., OH). pp 274-284 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The role of pH in producing passive conditions on buried or immersed steel is widely recognized. In the present study, the changes in solution chemistry, in particular pH, due to cathodic polarization were examined in a simulated-soil environment. The application of cathodic polarization significantly increased the pH at the steel surface by promoting the reduction of oxygen (aerated solution) or reduction of water (deaerated solution). It was deter-

mined that the change in pH of the solution was controlled by the applied cathodic current density and the rate of migration of hydroxyl ions from (or protons toward) the steel surface. The initial pH and the pH of the bulk solution had only a minor influence on the final pH attained, while the polarized potential indirectly affected the final pH. 18 references, 6 figures, 1 table.

9401 **Present situation and future developments of corrosion protection coatings used by the gas industry in France - characteristics and evaluation of performances.** Ratard, D.; Pollard, J.Y. pp 285-300 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The evolution of coating materials, application processes and laboratory techniques prompted Gaz de France, at its CERIG Research Centre, to investigate methods which would best meet the requirements of the construction and exploitation of gas transmission and distribution pipelines. The experimental data collected in this paper deal with some of the basic characteristics of anticorrosion coatings currently available. Four specific points are dealt with: impact behavior, water absorption, cathodic disbondment and the effect of the working environment. 30 references, 20 figures, 4 tables.

9402 **Development of intelligent gasmeter for customer's total safety.** Fujimoto, T. (Tokyo Gas Co. Ltd., Japan). pp 768-776 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

To prevent gas accidents such as explosions resulting from the leakage of gas, Tokyo Gas Co., Ltd. has endeavored to popularize the use of safety equipment such as fuse-cocks and toughened gas hoses, particularly in newly constructed houses. However, as this type of equipment is costly due to additional installation charges, its installation has not been widespread among existing houses. Accordingly Tokyo Gas developed microcomputer-controlled gas shut-off equipment which may be easily installed in existing houses. Furthermore, it is very effective in preventing gas suicides. This equipment detects the causes of gas accidents through a sensor and the microcomputer makes a judgment as to whether the gas flow is normal or not, then, if abnormal, the computer operates to automatically shut-off the gas at the gas meter to prevent gas accidents. The entire system is built as an integral unit with the gas meter, shut-off valve and flow rate sensor built inside one casing. The microcomputer is directly mounted onto the front of the gas meter. Another feature of this device is the use of long-life lithium batteries as a source of power, eliminating the need for any external power supply. 7 figures.

9403 **A.G.A. Pipeline Research Committee research into control of defects, corrosion, and defect repair.** Hawes, N.L. pp 1092-1098 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

This paper summarizes the results of research by the Pipeline Research Committee of the American Gas Association in four areas of concern to pipeline operators: (1) Repair of defects. The effectiveness and safety of properly designed and installed full encirclement split sleeves has been demonstrated. (2) Assessment of corrosion flaws. Relationship between defect size and pipe strength have been developed which allow realistic assessment of corrosion flaws. (3) Impact damage behavior. Early results from an investigation into the effect of third party mechanical damage on the burst strength of line pipe indicate that a combined gouge and dent results in a more pronounced strength reduction than gouges alone. A temperature relationship between flaw size and failure propagation has been identified. (4) Cathodic protection monitoring. A graphical extrapolation technique has been developed which eliminates inaccuracies normally introduced in compensating for soil IR drop in conventional pipe-to-soil potential measurements.

0330 Properties

REFER ALSO TO CITATION(S) 9373, 9385, 9417, 10370

9404 **Application of a new equation of state to study the retrograde condensation of two natural gases.** Discamps, D.; Behar, E. pp 992-1006 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A new equation of state, called the Developed Redlich-Kwong (RKD) equation, has been proposed by R. Simonet and E. Behar in order to represent, with good accuracy, PVT and liquid-vapor equilibrium properties of hydrocarbon mixtures under reservoir conditions. These equation parameters are computed through a set of correlations based on the three parameter corresponding states principle. However we have also determined, for some components, the direct dependence of the equation of state parameters on temperature. We present here the application of this equation to study the retrograde condensation of two North Sea natural gases. In order to do that, we have established an analytical procedure which leads to a compositional representation of the reservoir fluid up to C_{16} fraction. We have observed that improved results are obtained when computing PVT properties if the C_{17}^+ residue is considered to be a pseudobinary instead of being treated as a single-pseudo-component. Liquid deposit curves in good agreement with experimental ones have been thus calculated, but the retrograde dew pressure is systematically lower than the measured point by about 10%. We have also noticed that lower values for the interaction coefficient between the C_{17}^+ residue and the light hydrocarbon (C_1-C_2-C_3) are necessary when using the relations giving the direct dependence of the equation of state parameters on temperature. 3 references, 5 figures.

9405 **Burnett-isochoric P-V-T measurements of hydrogen-methane mixtures.** Magee, J.W.; Kobayashi, R. pp 1007-1011 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The P-V-T surface of a nominally 80 mol % methane -20 mol % hydrogen mixture has been defined from 130 K to 600 K for pressures as high as 70 MPa. The data were taken primarily along lines of constant volume (isochores), but were coupled to isothermal Burnett data which were taken to identify the precise density of each isochore. An examination of the isochoric inflection locus where (d² P/dT²)/sub rho/ = 0 showed that although this mixture is methane-rich it has an open isochoric inflection locus resembling hydrogen rather than methane. The broader conclusion is that the P-V-T surfaces of mixtures containing hydrogen (and/or helium) are greatly influenced by hydrogen even though the concentration of the latter may be as low as a few mol %. Equations of state used to describe such mixtures must take such behavior into account. 4 references, 5 figures.

9406 **Calorimetric studies of clathrate hydrates.** Callanan, J.E. (National Bureau of Standards, Boulder, CO); Sloan, E.D. pp 1012-1021 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

World resources of natural gas in hydrate form are abundant. Thermophysical property measurements are vital to the determination of the exploitability of this resource. The natural gas hydrates are clathrates; the hydrate lattice exists in one of two special structures (I and II), both of which form with cavities or cages in which molecules in specific size ranges can be trapped. Heat capacities as a function of temperature and, where appropriate, heats of dissociation have been measured for tetrahydrofuran (II), ethylene oxide (I), and cyclopropane (I and II) hydrates by differential scanning calorimetry. The heat capacities were found to vary both with structure and with quest. Scanning calorimetric techniques and

sample handling techniques suitable for dealing with hydrates in the subambient region were developed. 17 references, 4 figures, 2 tables.

9407 **Fluid property research at the National Bureau of Standards, Boulder.** Hanley, H.J.M. pp 1022-1029 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The goals and philosophy of the Fluid Properties Group, NBS-Boulder, are discussed and the experimental facilities are reviewed. The group attempts to merge experiment, basic theory of fluids, and data correlation so that all facets complement and support each other to give an integrated program. Specific systems selected for our studies are simple enough for unambiguous theoretical and experimental analysis but represent a class of systems of general interest. For example, we report on PVT measurements of H_2S and on CO, which are typical of polar and reactive components in synfuels; viscosity data for C_1/C_2 mixtures are given to represent the transport behavior of fluids of interest to the gas industry. We mention fundamental studies of mixtures via computer simulation which raise very basic theoretical questions yet, with corresponding states, contribute to a practical prediction procedure to calculate thermophysical mixture properties. Three important correlations for propane, N- and i-butane are also mentioned. 9 references, 3 figures, 1 table.

9408 **Gas supercompressibility factor correlation research.** Starling, K.E.; Kumar, K.H.; Savidge, J.L. (Univ. of Oklahoma, Norman). pp 1030-1037 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Gas supercompressibility factor and through the defining relations, compressibility factor calculations are used in a number of gas industry applications, including gas measurement with orifice meters, flow of natural gas through pipelines, and gas volumes for custody transfer and storage purposes. This work presents the status of the development of a new more accurate and widely applicable supercompressibility factor correlation. The uncertainties in the calculation of compressibility factors for pure methane using the provisional correlation approach the uncertainties in the most accurate experimental data available for this fluid. 16 references, 1 figure, 4 tables.

9409 **Measurements and improved prediction method of compressibility factors in custody transfer situations.** Reintsema, S.R.; Reinhardus, H.C.; Bouw, H.D.; Rensen, W.M. (N.V. Nederlandse Gasunie, Groningen, Netherlands). pp 1038-1052 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A computer-controlled data-acquisition system for the rapid collection of experimental compressibility factor data is presented. The accuracy for each data point collected is better than 0.1%. A data bank has been set up with these data that contains more than 2000 data points for 45 different gases, both natural and synthetic gases. The experimental results have been compared with calculated NX-19 results. A virial equation of state has been developed that predicts the experimental natural gas data to within 0.15%. The impact of this investigation on related international studies on PVT-behavior of natural gas is discussed. 18 references, 3 figures, 2 tables.

9410 **Modelling the thermodynamic properties of natural gases in the region of retrograde condensation.** Moorwood, R.A.S.; Counsell, J.F.; Green, H.J. (BP Research Centre, Sunbury-on-Thames, England). pp 1053-1062 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A number of cubic equations of state have been tested for modelling retrograde condensation in natural gases. Initially the equations were tested on the binary system methane+heptane and then applied to a number of natural gas mixtures in the range 275 to 375K and 1 to 30MPa. Correlations for interaction parameters have been established that optimize the performance of these equations. It is only possible to model the retrograde dew points accurately if other thermodynamic properties are deliberately misrepresented. 11 references, 5 figures, 5 tables.

9411 **PVT, VLE and H data from Burnett-isochoric apparatus.** Hall, K.; Eubank, P.; Holste, J. pp 1063-1069 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The Burnett-coupled isochoric method is a remarkably versatile technique for measuring the thermophysical properties of fluids and fluid mixtures. Measuring only pressure and temperature precisely provides state-of-the-art values for densities, Z-factors, compressibilities, virial coefficients, excess volumes, compositions, energies, enthalpies, Helmholz and Gibbs functions. In addition, extremely precise pressure measurement permits determination of the dew/bubble point locus. 17 references, 4 figures.

9412 **Thermodynamic properties of gaseous mixtures containing water.** Wormald, C.J.; Colling, C.N.; Sellars, A.J. (Univ. of Bristol, England). pp 1070-1079 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Compression experiments on gaseous mixtures containing water vapor have failed to yield good thermodynamic data due to large adsorption errors. Flow calorimetric measurements of the excess enthalpy provide an alternative source of data. At temperatures between 363 and 698 K measurements of the excess enthalpy of water vapor + hydrogen, + methane, + carbon monoxide and + carbon dioxide have been made. Most of the measurements extend up to 12 MPa. Analysis of the measurements at low pressures yields values of the cross term second virial coefficient B_{12}. Evidence for a specific interaction between water and carbon dioxide is found, and the enthalpy of association is -14+-2 kJ mol^{-1}. The measurements at high pressures can be fitted by the Peng-Robinson equation of state using values of the interaction parameter k/ sub ij/ which are temperature dependent. Integration of the excess enthalpy measurements yields excess volumes and compression factors for the mixtures. 23 references, 7 figures.

0340 Combustion

REFER ALSO TO CITATION(S) 9385, 9389, 10395, 10466

9413 **(CONF-8311118—1) Evaluation of NO/sub x/ emissions on a pilot-scale furnace.** Abbasi, H.A.; Khinkis, M.J.; Fleming, D.K. (Institute of Gas Technology, Chicago, IL (USA)). 1983. 39p. Institute of Gas Technology, 3424 South State St., IIT Center, Chicago, IL 60616.

From 44. annual conference on glass problems; Urbana-Champaign, IL, USA (15 Nov 1983).

An experimental program is under way to assess combustion modifications for control of NO/sub x/ emissions from natural-gas-fired glass melting furnaces. The program was undertaken by the Institute of Gas Technology (IGT) for the Gas Research Institute (GRI), with the technical assistance of a glass industry advisory committee. The results of pilot-scale testing are described. The experiments were conducted on a pilot-scale glass furnace simulator using scaled flat-floor and inclined-floor melter ports. The furnace load consisted of a layer of molten glass over a series of refractory-covered heat exchangers. Operating conditions were adjusted to simulate those found in container glass melters. Significant reduc-

tions in NO/sub x/ emissions (compared to NO/sub x/ at reference conditions of 45° angle firing and 120 ft/s fuel injection velocity) were achieved by (1) reducing fuel/air mixing rates by decreasing fuel and/or air velocity or changing burner angle or location, (2) burning the fuel with close to stoichiometric air and adding ambient secondary air downstream of the furnace exhaust gases, and (3) burning part of the fuel with very high excess air and adding the remaining fuel downstream of this primary combustion zone. Low-NO/sub x/ conditions, in most cases, did not increase the CO emissions or reduce the heat transfer to the glass.

9414 **Lean flammability limit of some gaseous mixtures involving methane.** Karim, G.A.; Boon, S.; Wierzaba, I. pp 980-990 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The paper presents consistent data for the lean flammability limit at atmospheric pressure (upward flame propagation) obtained under isothermal conditions down to -150°C for various gaseous mixtures involving methane. The role of diluents was also examined. The lean flammability limit of homogeneous fuel-air mixtures was considered on probabilistic basis. For safety considerations the zero probability figure is quoted. The paper then discusses the extent of the relative errors that would be involved when predicting the flammability of fuel mixtures in air and when present with additional gaseous inerts as evident in a wide variety of natural, industrial and in situ recovery gaseous fuels. 4 references, 10 figures, 3 tables.

9415 **Improved utilisation of gaseous fuels: overview of technological developments.** Winter, E.F.; Rotte, J.W. pp 1121-1135 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The gas industry and the gas equipment industry worldwide are expending considerable effort on the development of new gas utilisation technology which takes advantage of the characteristics of gaseous fuels. An overall view is presented of some of the more important areas in which development is being pursued, and of recent developments which are now able to be exploited. The types of development are classified into three overall (though overlapping) groups related to: improvements in energy efficiency, improvements in product quality, and the reduction of pollution. A necessarily brief indication is given of the location of projects which have been, or are being, pursued under these headings.

04 OIL SHALES AND TAR SANDS

REFER ALSO TO CITATION(S) 9218

0403 Drilling, Fracturing, And Mining

9416 **Infill drilling for shale gas development: A field case study.** Horton, A.I.; Mercer, J.C. (U.S. DOE Morgantown Energy Technology Center). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11182**: 1-11(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

The U.S. Department of Energy has conducted a reservoir simulation study of a producing Devonian shale reservoir in Meigs Co., Ohio, following an extensive field testing program to determine the parameters controlling production from this unconventional gas resource. The purpose of the study was to determine the possible impact of infill drilling in established areas of Eastern gas shales production. A dual porosity reservoir simulator that was developed especially for shale gas formations was used in the study. The simulation study applied the results of the previous field test program to history match the production from shale gas wells located near the test site in Meigs County, Ohio. A series of 70-year simulations showed that by infill drilling now, 35 years after the completion of the discovery well, cumulative production can be increased by 30 percent or more. Had the closer well spacing been implemented at the earliest possible time, cumulative production over the 70-year period could have been increased by 60 percent or more.

0404 Oil Production, Recovery, And Refining

9417 **(BNL—33932) Flash pyrolysis of oil shale with various gases.** Steinberg, M.; Fallon, P.T. (Brookhaven National Lab., Upton, NY (USA)). Oct 1983. Contract AC02-76CH00016. 15p. (CONF-840415—13). NTIS, PC A02/MF A01. Order Number DE84005316.

From 187. national meeting of the American Chemical Society; St. Louis, MO, USA (8 Apr 1984).

The flash pyrolysis of Colorado Oil Shale with methane at a temperature of 800°C and pressure of 500 psi appears to give the highest yield of hydrocarbon gas and liquid followed by hydrogen and lowest with helium. In the methane pyrolysis over 54.5% of the carbon in the kerogen is converted to ethylene and benzene. The flash pyrolysis with hydrogen (flash hydropyrolysis) of the oil shale at increasing temperatures showed a rapidly increasing amount of methane formed and a decrease in ethane formation, while the BTX (benzene mainly) yield remained at approximately 10%. At 950°C and 500 psi almost all (97.0%) of the carbon in the kerogen is converted to liquid and gaseous hydrocarbons. Experiments with a mixture of a New Mexico sub-bituminous coal and oil shale under flash hydropyrolysis and methane pyrolysis conditions indicated higher yields of methane and ethylene and slightly lower yields of benzene than predicted by partial additive calculations. These exploratory experiments appear to be of sufficient interest to warrant a fuller investigation of the interaction of the natural resources, oil shale, coal and natural gas under flash pyrolysis conditions.

9418 **Mineral reactions during high temperature oil shale processing.** Thomson, W.J. (Department of Chemical Engineering, Washington State University). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **2**: 512-517(Aug 1983). (CONF-830812—). Contract AT20-81LC10650.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The important mineral reactions which take place during high temperature oil shale processing are identified and discussed. Kinetic measurements of carbonate mineral decomposition are presented for six different oil shales, including the reversible nature of calcite decomposition. It is concluded that ankeritic dolomite decomposition can be prevented by relatively low over-pressures of CO_2 up to temperatures of 925 K for dolomites which are closer to ankerite. The catalytic properties of mineral decomposition products (CaO and Na_2O) relative to char combustion are presented and attributed to their chemisorption properties. Chemisorption phenomena was also found to be important during the recarbonation of CaO to $CaCO_3$.

0405 Properties And Composition

REFER ALSO TO CITATION(S) 9418

9419 **The relation between deformation recovery and in-situ stress magnitudes.** Blanton, T.L. (Science Applications Inc.). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE/DOE 11624**: 213-218(Mar 1983). (CONF-830305—).

From SPE symposium on low permeability; Denver, CO, USA (14 Mar 1983).

In this paper a theoretical basis is developed for calculating in situ stress magnitudes from recovery deformations measured in rock. The constitutive theory used assumes that the rock is linearly viscoelastic, homogeneous, and non-aging. These assumptions yield

explicit integral equations relating strain as a function of time to stress history, which is taken to be instantaneous unloading of the rock. Solutions are obtained for recovery of isotropic and transversely isotropic core in which time-dependent behavior is contained in creep compliance terms and Poisson's ratio terms are constant. The main results for both cases are equations that allow calculation of horizontal principal stresses from vertical stress, principal recovery strains, and material properties that do not depend on time. For the isotropic case, the only material property required is Poisson's ratio. For the transversely isotropic case, two Poisson's ratio terms as well as the ratio of creep compliances are required. This last solution assumes that the vertical stress is parallel to the axis of material property symmetry.

0406 Direct Uses And By-products

REFER ALSO TO CITATION(S) 9332

0407 Health And Safety

REFER ALSO TO CITATION(S) 10926

05 NUCLEAR FUELS

9420 (Juel-Conf—17, pp 31-41) **Fuel cycles in nuclear power plants.** Merz, E. Jan 1983. (In German). Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

In Benefits and risks of nuclear energy.

The technology of energy supply distribution in the Federal Republic of Germany is satisfactory. Uranium deposits are sufficient. The technology of WAA has also been tried and proved. Procedures for processing and storing wastes on the appropriate sites are also available. Final storage of conditioned wastes can be realized as well.

0501 Reserves

REFER ALSO TO CITATION(S) 10956, 10957, 10958

9421 (USGS-PP—1161-A-BB) **Genesis of uranium- and gold-bearing Precambrian quartz-pebble conglomerates.** Armstrong, F.C. (ed.). (Geological Survey, Reston, VA (USA)). 1982. 431p. (CONF-7510205—). NTIS, PC A19/MF A01 - GPO. Order Number DE84900262.

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Portions are illegible in microfiche products.

This workshop was held to examine the origins of uranium bearing placer deposits of South Africa, Canada and the United States in order that future prospectors who are seeking new sources for uranium fuels could profit by knowledge of the geological events believed to have led to known deposits. Detailed descriptions of the sedimentology, petrology and geochemistry of Witwatersrand gold reefs and Blind River - Elliot Lake Uranium deposits are provided.

9422 (USGS-PP—1161-A-BB, pp A1-A7) **Investigation of Witwatersrand uranium-bearing quartz-pebble conglomerates in 1944-1945.** Bourret, W. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The paper discusses the results-both short- and long-term of a 1944 study undertaken by a team from the Manhattan Project (supported by the governments of Great Britain and Canada) to assess the potential for uranium occurrence in the Witwatersrand mining region of South Africa. Details are given on the methods used by the Manhattan team and the results of the sampling study and survey that the team conducted in South Africa. The findings for 23 mines that were surveyed in the Witwatersrand are documented. These mines were the major producing mines in the Witwatersrand region. The prior research that led the Manhattan Project administrators to concentrate efforts on the Witwatersrand is described. The history of uranium production in the Rand since the 1944 study is delineated. Tables show the findings of the sampling study in terms of various major mines. A graph is included to show the growth of uranium production in the Witwatersrand from the initiation of the first operation in 1952 to 1975.

9423 (USGS-PP—1161-A-BB, pp D1-D8) **Uraniferous quartz-pebble conglomerates in South Africa.** von Backstroem, J.W. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The purpose of this paper is to give a short background statement summarizing data on the Dominion Reef Group, the Witwatersrand Supergroup, and the Ventersdorp Contact Reef, with particular reference to the close relationship of gold and uranium with sedimentary features as well as the mineralization, conditions of deposition, and the nature of the quartz-pebble conglomerates.

9424 (USGS-PP—1161-A-BB, pp E1-E6) **Examples that illustrate sedimentological aspects of the proterozoic placer model on the Kaap-Vaal Craton, Witwatersrand, South Africa.** Minter, W.E.L. (Anglo American Corp., Welkom, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

In the fluvial-fan model of Proterozoic placers in South Africa, mid-fan and fanbase environments are illustrated by the Ventersdorp Contact Reef, proximal braided-belt environments by the B Reef, distal braided-belt environments by the Vaal Reef, and deltaiclike environments by sheets, ribbons, and pods at the extremities of the South and Basal Reefs. The nature of distribution of gold and uranium in these various environments has been evaluated and the knowledge successfully applied by the author to the valuation and practical mining of the reefs since 1965.

9425 (USGS-PP—1161-A-BB, pp F1-F8) **Dominion reef group, Western Transvaal, South Africa.** von Backstroem, J.W. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The Dominion Reef Group, disconformably overlain by the Witwatersrand Supergroup, outcrops in four separate areas in the Western Transvaal, Republic of South Africa. It consists essentially of a basal sedimentary formation as much as 90 m thick, which contains two important uranium-bearing quartz-pebble conglomerates known as the Upper Reef and the Lower Reef; an intermediate formation of altered andesitic lava flows as much as 650 m thick with some intercalated beds of tuff; and an upper formation of altered cherty rhyolites and dacites with a thickness of at least 1500 m. The basal sedimentary formation of the Dominion Reef Group represents the earliest sedimentation in the region (>2800 million years) predating that of the Lower Witwatersrand Group (>2700 million years). This paper is devoted mainly to a description of the auriferous reefs, their depositional environment, pay streaks that are a feature of these reefs, their mineralogy, and the highly mineralized, pebbly, silicified sandstone known as the Pay Band present near the top of the Upper Reef. The relation of ore deposits to structures, and the possible source of the uranium, are discussed. Reasons are given why a hydrothermal origin for the presence of uranium in the reefs is thought to be untenable.

9426 (USGS-PP—1161-A-BB, pp G1-G9) **Crossbedded nature of Proterozoic Witwatersrand placers in distal environments and a paleocurrent analysis of the Vaal Reef placer.** Minter, W.E.L. (Anglo American Corp., Welkom, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The Proterozoic placers in South Africa that were deposited in distal environments are referred to as carbon-seam reefs. They are pebbly quartz-arenite units with a characteristic pi-crossbedded internal geometry. Their external geometry, which is sheetlike, was produced by the braiding of shallow channels in a dendroidal belt. Low-variance, unimodal, paleocurrent data from the Vaal Reef are used to illustrate a transgressing, braided, fluvial environment followed by longshore drift in a deepening water environment. The total variance, evident in detrital heavy-mineral concentrations of carbon-seam placers, is related to the internal geometry, external geometry, and areal position within the deposit.

9427 (USGS-PP—1161-A-BB, pp J1-J5) **Microprobe analyses of uranium and thorium in uraninite from the Witwatersrand, South Africa, and Blind River, Ontario, Canada.** Grandstaff, D.E. (Temple Univ., Philadelphia, PA). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Microprobe analyses of uranium and thorium in uraninite grains from the Witwatersrand, South Africa, and Blind River, Ontario, reveal that although individual grains are fairly homogeneous, the assemblage of grains is quite heterogeneous. This heterogeneity appears to favor genetic concepts advocating a detrital, placer origin for the uraninite.

9428 (USGS-PP—1161-A-BB, pp K1-K3) **Preliminary notes concerning the uranium-gold ratio and the gradient of heavy-mineral size distribution as factors of transport distance down the paleoslope of the Proterozoic Steyn Reef placer deposit, Orange Free State Goldfield, Witwatersrand, South Africa.** Minter, W.E.L. (Anglo American Corp., Welkom, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The size decrease of quartz pebbles, pyrite nodules, and zircon grains, evident from samples of Steyn Reef taken from various positions down a paleoslope indicated by crossbedding data, confirms their detrital origin. An increase in the ratio of uranium to gold, which appears to be related to their original size-frequency distribution, also indicates the paleoslope direction and effectively distinguishes between blanket and carbon-seam reefs.

9429 (USGS-PP—1161-A-BB, pp M1-M22) **Geochemistry and morphology of mineral components from the fossil gold and uranium placers of the Witwatersand.** Hallbauer, D.K. (Mining Tech. Lab., Johannesburg, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Using the hydrofluoric-acid leaching technique to obtain heavy-mineral grains intact from Witwatersrand conglomerates and the scanning electron microscope with microanalyzer attachment, the technique of morphological microscopy was applied to observe the three dimensions of the grains and to study their composition. In combination with stereo x-ray radiography of rock slabs and the application of various geochemical techniques, this afforded new information on the processes that led to the formation of Precambrian placer deposits. Fossilized organisms could consequently be recognized from the morphology of their carbonaceous remains, permitting their role in the concentration of gold and uranium to be explained. Studies of the morphology of different types of gold, pyrite, and other minerals have permitted conclusions on the origin and distribution of economically important minerals, as well as on the palaeoenvironment of Precambrian placers that were not possible with the classical methods of microscopy.

9430 (USGS-PP—1161-A-BB, pp N1-N29) **Uraniferous constituents of the Witwatersrand conglomerates: ore-microscopic observations and implications for the Witwatersrand metallogeny.** Schidlowski, M. (Max-Planck-Institut fuer Chemie, Mainz, Germany). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

A review is given of the available ore-microscopic evidence pertaining to the origin of the main uraniferous constituents of the blanket. Uraninite occurs principally in the footwall portions of the reefs as rounded or muffin-shaped grains some 100 micrometers in diameter, which leave little doubt as to their waterworn, abraded nature. It can be demonstrated by comparison with detrital monazite grains from present-day beach placers that the muffin shape displayed by individual uraninite particles constitutes an unquestionable sedimentary abrasion form. Brannerite appears to be an authigenic constituent of the reef, most probably formed from uraninite and rutile as a result of postdepositional pseudohydrothermal reconstitution. Branneritization of primary detrital uraninite grains has often preserved the characteristic abrasion forms of the uraninite parents (so-called uraninite ghosts). As for carbonaceous matter or thucholite, microscopic evidence decidedly favors a genetic concept involving a radiolytic polymerization of originally mobile hydrocarbons (most probably indigenous to the rock) by pre-existing uraninite constituents, with these latter subsequently subjected to progressive replacement by the ambient organics. Apart from a morphologic description of the principal carbon aggregates in the reef, a critical appraisal is given of a recently proposed different concept for the origin of the organic substances. Altogether, the mineragraphic evidence lends strong support to a modified placer theory previously advanced for the origin of the Witwatersrand metallogenic province as a whole.

9431 (USGS-PP—1161-A-BB, pp O1-O7) **Some aspects of the development of the Vaal Reef uranium-gold carbon seams, Witwatersrand sequence: organic geochemical and microbiological considerations.** Zumberge, J.E. (Cities Service Co., Tulsa, OK); Nagy, B.; Nagy, L.A. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The solvent-insoluble organic matter (kerogen) that is the predominant syngenetic component of the Vaal Reef carbon seams was analyzed by combined high-vacuum pyrolysis gas-chromatography mass spectrometry, combined electron microprobe-scanning electron microscopy and electron paramagnetic resonance spectroscopy. The pyrolysis results indicate that the Vaal Reef carbon is a random polymer-type matter consisting mainly of aromatic and short-chain aliphatic hydrocarbons, as well as aromatic and other organic-sulfur constituents. Scanning electron microscopy revealed coccoid and filamentous microstructures in the carbonaceous seams. These structures are conceivably of biological affinity and may be fossil blue-green algae and (or) bacteria. Gold is often concentrated at the interfaces of admixed clay-carbon microenvironments. This implies physical and chemical interactions between clays and organic matter conducive to the entrapment of detrital gold during deposition and the crystallization of colloidal/dissolved gold in the carbon seams. High concentrations of organic free radicals (molecules with unpaired electrons) in the carbonaceous matter, deduced from electron paramagnetic resonance spectroscopy, suggest that radiation emitted from uranium played a unique role in the reconstitution and polymerization of the progenitor biochemicals.

9432 (USGS-PP—1161-A-BB, pp Q1-Q23) **Some aspects of Witwatersrand mineralization, with special reference to uranium minerals.** Feather, C.E. (Anglo American Research Labs., Transvaal, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Evidence is presented that suggests that temperatures of metamorphic activity in the vicinity of 400 to 600°C have been

achieved in the Witwatersrand gold-bearing reefs, based on the chemical composition of mixed crystals of gersdorffite and cobaltite that are undoubtedly of authigenic origin, being deposited at the same time as the gold was redistributed and uraninite was probably recrystallized. Sedimentological studies support the view that uraninite is of detrital origin, but it has been suggested that the mineral resulted also from precipitation from solution, since the lichenlike plant, which is seen today as carbon (thucholite) possibly also absorbed uranium from solution during its growth. However, the UO_2/ThO_2 ratio varies over a wide range in the grains from single reef samples, suggesting a multiple granitic or pegmatitic detrital source. All original features of the uraninite grains have been destroyed by subsequent partial chemical dissolution and alteration to the uranium titanate mineral brannerite (confirmed by electron microprobe and x-ray diffraction studies). Age determination by ion microprobe on minute volumes within the metamict crystals gives the same age (about 1800 million years) for both uraninite and brannerite, suggesting that recrystallization and alteration took place at the same time. This is younger than results obtained on whole grains as determined by other investigators (about 2000 million years), possibly because whole grains may be contaminated with some radiogenic lead of a greater age, which occurs in pits and cracks in the grains and thus was not completely purged from the grains at the time of recrystallization.

9433 (USGS-PP—1161-A-BB, pp R1-R26) **Uranium mineralization of the Witwatersrand and Dominion Reef systems.** Simpson, P.R.; Bowles, J.F.W. (Inst. of Geological Sciences, London, England). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Uranium-bearing minerals in the Witwatersrand and Dominion Reef sediments have been studied by ore microscopic, electron microprobe, fission track, and neutron activation analytical methods to determine the controls of uranium mineralization. In the Dominion Reef, uranium-thorium ratios between 3.1 and 5.6 indicate substantial amounts of thorium-rich resistate minerals. The Witwatersrand sediments have uranium-thorium ratios ranging between 7.1 and 19.6, indicating lesser amounts of resistates consistent with the lower-energy depositional environment. The proximal or nearshore deposits are of blanket type but are distinguished from the Dominion Reef by the abundance of concretionary pyrite formed within the basin and the presence of carbonaceous matter. The distal deposits contain decaying organic material, which has precipitated both uranium and gold from solution. Subsequent metamorphism has resulted in the formation of carbonaceous material bearing a finely disseminated low-thorium pitchblende and a fine dissemination of gold associated with sulphides and arsenides. Further evidence of the existence of uranium in solution is to be found in the blanket deposits. In this case fine disseminations of uranium (>500 parts per million) occur in clay minerals within concretionary pyrite nodules and in lenticles formed of clay minerals in Witwatersrand blanket deposits. They represent reduction-deposition of the soluble uranyl ion below the sediment-water interface where conditions are reducing. Allogenic thorian uraninite from the present-day Indus River has a texture, composition, and association with gold and pyrite similar to allogenic uraninite in the Witwatersrand and Dominion Reef Systems.

9434 (USGS-PP—1161-A-BB, pp S1-S12) **Detrital uraninite and pyrite: are they evidence for a reducing atmosphere.** Simpson, P.R.; Bowles, J.F.W. (Inst. of Geological Sciences, London, England). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Many occurrences of uraniferous quartz-pebble conglomerates are known to date from the period 2.8 to 2.0 billion years ago. Comparison of modern alluvial sediments of the Indus River with those of the Dominion Reef and Witwatersrand Systems indicates stable assemblages of detrital thorian uraninite and pyrite of similar grain size and composition. Authigenic pitchblende and pyrite provide indirect evidence of uranyl and sulphate ions coexisting with detrital thorian uraninite and pyrite during the formation of Witwatersrand sediments. It is suggested that this bimodal form of transport and deposition can be most readily accounted for by a model in which the sulphate and uranyl ions exist in superficial, oxidized, active sediments and river waters draining into the Witwatersrand Basin while detrital grains of uraninite were contained within the bedload of streams in reducing conditions below the sediment/water interface. This would prevent oxidation of the abundant organic matter, now represented by carbonaceous material, to give carbonate and bicarbonate ions, which form uranyl carbonate complexes that are highly soluble even in reducing conditions. The occurrence of Precambrian uraninite-bearing conglomerates is therefore controlled by geological and not atmospheric conditions. It is suggested that the deposits are the erosion products of the upper layers of a primitive, layered Archaean crust containing granitic rocks enriched in thorian uraninite. The period 2.8 to 2.0 billion years ago is thought to represent a unique phase of crustal evolution, when extensive erosion of uranium-rich upper crust resulted in the deposition of uraniferous sediments in enclosed basins.

9435 (USGS-PP—1161-A-BB, pp T1-T14) **Uranium in Precambrian Moeda Formation, Minas Gerais, Brazil.** Villaca, J.N.; Moura, L.A.M. (Nuclebras, Belo Horizonte, Brazil). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The Quadrilatero Ferrifero with an area of about 7000 km^2 is located south of Belo Horizonte in Minas Gerais, Brazil. Precambrian metaconglomerates (Proterozoic) of the Moeda Formation and Maquine Group are believed to be favorable host rocks for uranium deposits. Some areas are now being studied or have work planned for next year. Drilling succeeded in detecting at least three channels in different areas with ore-grade uranium-bearing oligomictic conglomerates. Reserve calculations require additional detailed work in those areas. Some models indicate that the sediments came from the Sao Francisco Craton, but paleocurrent directions in the Gandarela Syncline, as well as at Jacobina, indicate that the detritus came from the east, at least at these sites. This means that other cratonic areas must exist to the east of these outcrops. The Quadrilatero Ferrifero is mostly included between lat 19°45′ and 20°30′S and long 43°22′30″ and 44°7′30″ W and lies near Belo Horizonte, Minas Gerais State, Brazil.

9436 (USGS-PP—1161-A-BB, pp U1-U23) **Blind River uranium deposits: the ores and their setting.** Robertson, J.A. (Ontario Geological Survey, Toronto). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

In the Blind River area, Proterozoic clastic sedimentary and minor volcanic rocks (Huronian Supergroup) unconformably overlie and transgress northward over dominantly granitic Archean terrane (2500 million years) and are intruded by Nipissing Diabase (2150 million years). Later deformations and metamorphic events are recognized. The Matinenda Formation (basal Huronian) comprises northward-derived arkose, quartzite, and pyritic, uraniferous oligomictic conglomerates, which contain 75 percent of Canada's uranium reserves. Historic grades approximate 2 pounds U_3O_8/ton (1 kilogram/metric ton), but lower grade material can be mined with increasing price. Some thorium and rare earths have been marketed. The conglomerate beds lie in southeasterly striking zones controlled by basement topography down-sedimentation from radioactive Archean granite. Distribution of monazite relative to uraninite and brannerite and the presence of uranium values in overlying polymictic conglomerates, which truncate the ore beds, indicate that the mineralization is syngenetic, probably placer. The role of penecontemporaneous mafic volcanics is problematical, but these could have been a source for sulphur in the pyrite. Drab-coloured rocks, uranium and sulphide mineralization, and a post-Archean regolith formed under reducing conditions all suggest a reducing environment. Sedimentary features indicate deposition in fast-flowing shallow water and possibly a cold climate. In the upper Huronian (Lorrain Formation), a monazite and iron oxide assemblage associated with red beds suggests a change to oxidizing conditions.

9437 (USGS-PP—1161-A-BB, pp V1-V8) **Some metallogenic features of the Huronian and post-Huronian uraniferous conglomerates.** Ruzicka, V. (Geological Survey of Canada, Ottawa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Uraniferous conglomerates with syngenetic mineralization are restricted to lower Proterozoic sediments. The depositional environment was near volcanic centres; excessive sulfur, a product a volcanic and postvolcanic activity, apparently caused sulfurization of some minerals and of hydrocarbon. The sedimentary syngenetic origin of uranium mineralization may be illustrated. The cycle starts with deposition of coarse grains of quartz, continues with the deposition of a mixture of finer grains of quartz and pyrite with distinct graded bedding, is followed by deposition of monazite and brannerite, and ends with deposition of fragmented fine grains of uraninite embedded in sulfur-rich hydrocarbon. This situation apparently testifies to the fact that the carbonaceous material is a product of algal mats that existed in quiet times between cycles of sedimentation. The succeeding cycle again starts with the deposition of coarse grains of quartz. Uraniferous conglomerates with epigenetic mineralization are localized in regions containing rocks with higher contents of uranium. Primary concentration of uranium minerals in these source rocks can also be syngenetic. Deposition of uranium took place by one or more epigenetic processes: adsorption, complexing, precipitation, or redox changes according to the degrees of solubility and stability of uranium compounds. Evidence of these mentioned features is based upon studies on the Huronian uraniferous conglomerate from Elliot Lake, Canada, and on the late Precambrian and Paleozoic radioactive conglomerates from the eastern Ural Mountains and Enisey Crest region, USSR.

9438 (USGS-PP—1161-A-BB, pp W1-W17) **Temporal and other factors affecting deposition of uraniferous conglomerates.** Roscoe, S.M. (Geological Survey of Canada, Ottawa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Uraniferous, auriferous, pyritic quartz-pebble conglomerates, unknown in strata less than 2.3 billion years old, are considered preoxyatmoversion analogues of black-sand placers common in younger terrestrial sediments. Radioactive conglomerates in Huronian rocks near Elliot Lake, and others, are within the most proximal facies of once-extensive sheets of terrigenous clastics derived from soil mantles and chemically mature colluvium that covered Archean protocontinents weathered under an atmosphere that lacked free oxygen. The initial entrapment of quartz-gravel-bearing grits in Elliot Lake Group, as well as subsequent deposition, deformation, and preservation of Huronian rocks, was governed by the development of tectonically unstable conditions in an epicontinental sector of the Superior Craton. Warping of the southerly inclined paleoslope, adjustments along old fractures, and eruptions of basalt were accompanied by deposition of coarse clastic wedges or alluvial fans atop soil-mantled Archean basement rocks, weathered Huronian basalt flows, and finer grained sands that flanked or overlay other gritty conglomerate-bearing lenses. Successions resembling the Huronian Supergroup are found west of Hudson Bay, in Wyoming, and in central Quebec, suggesting that tectonic traps for coarse clastics with pyritic conglomerates developed extensively around a more stable core of the Archean protocontinent about 2.5 billion years ago. Many of these remnants are buried under more extensively preserved younger Proterozoic strata, but the Paleoaphebian rocks should not be regarded as basal phases of the Proterozoic tectonostratigraphic units.

9439 (USGS-PP—1161-A-BB, pp X1-X14) **Genesis of Canadian uraniferous quartz-pebble conglomerate ores.** Little, H.W. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Uraniferous quartz-pebble conglomerate ores from deposits in Quebec, Ontario, and in the Northwest territories are described with reference to sedimentary history, provenance and metamorphic activity. Ores from the Blind River - Elliot Lake Groups are correlated with sedimentation from the Canadian Shield, with deposition in marine and non-marine environments along the Huronian geosyncline. The significance of Dollyberry lavas of the Quirke syncline in the interpretation of the geologic history of these ores is discussed relative to the Precambrian anoxygenic atmosphere. Parallel sediments in the Papaskwasati basin and the Sakami lake areas of Quebec are examined for uranium content and for thorium: uranium ratios. A description of uranium deposits in the Northwest territories is also offered. (DT)

9440 (USGS-PP—1161-A-BB, pp Y1-Y2) **Thorianite from the Hogatza Placer, Alaska.** Staatz, M.H. (Geological Survey, Denver, CO). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The thorianite in the Hogatza placer was derived from a gneissic monzonite that forms a border facies of the otherwise rather massive granodiorite of the Zane Hills pluton. The border facies is 5 to 10 times as radioactive as the main igneous mass. The uranium content of 11 samples of the gneissic monzonite ranged from 11 to 129 ppM (parts per million) and averaged 47 ppM. The thorium content of these samples ranged from 46 to 268 ppM and averaged 128 ppM. Concentrates of the heavy minerals from these rocks vary somewhat, but amphibole, pyroxene, magnetite, zircon, and sphene are abundant in most. Allanite and biotite occur in many samples, and thorianite, garnet, pyrite, molybdenite, muscovite, goethite, betafite, and thorite occur sparsely in some samples. The thorianite occurs as small cubes similar to those found in the Hogatza placer.

9441 (USGS-PP—1161-A-BB, pp AA1-AA26) **Genesis of uranium-gold pyritic conglomerates.** Myers, W.B. (Geological Survey, Reston, VA). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The ancient pyritic ore conglomerates have a common origin best exemplified by the Witwatersrand deposits. All contain detrital pyrite and uraninite, which are unstable in modern oxygenated environments and were deposited in a reducing atmosphere. The Rand reefs are not similar to modern gold placers. Placers result from the near incapacity of streams and currents to transport coarse gold. Placers as rich as Rand reef occur only in narrow paystreaks within 15 kilometers of a coarse-gold source. The board dispersion of gold in the reefs is due to solution transport of metal complexed as aurous sulfide, leached anoxygenically from crustal rocks, probably from sea-floor basalt, and precipitated by a slow reaction driven by the radioactive decay of detrital uraninite. Radiolysis of water on shallow marine unconformities resulted in diffusion of hydrogen to the atmosphere and a slight excess of hydroxyl free radical in the reef environment. The mild oxidizing tendency slowly dissolved uranium, precipitated gold, and oxygenated thucholite. These actions define a maturing process. A uraninite placer accumulating on an unconformity becomes progressively converted to a gold reef with little residual uraninite. The most mature reefs tend to grade toward the thucholite-seam type, very thin but exceedingly rich in gold. A combination of chemical attack and physical reworking accounts for the general thinness of mature reefs. Pyrite, like uraninite, decreases in abundance with increasing maturity; buffering by pyrite moderated the oxidative depletion of uranium. Where pyrite was scanty or absent, uraninite was completely dissolved by the effects of radiolysis and no ore formed.

9442 (USGS-PP—1161-A-BB, pp BB1-BB5) **Thoughts about uranium-bearing quartz-pebble conglomerates: a summary of ideas presented at the workshop.** Skinner, B.J. (Yale Univ., New Haven, CT). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

A summation of papers given at the Workshop on the Genesis of Uranium- and Gold-Bearing Precambrian Quartz-Pebble Conglomerates held at Golden, Colorado, on October 13-15, 1975, is presented. Seven pertinent topics, chosen by the author, are compiled from the several papers and are critically discussed. The time of formation of these deposits is between 3- and 2-billion years ago. The uraniferous conglomerates appear to be of fluvial origin and the known uranium reserves are plotted along an idealized fluviatile system. The source areas for the placers are related to 3 billion year old granites, greenstones and metamorphic rocks of the cratons - these most probably were located paleogeographically in a polar region. The role of diagenesis in the formation of uranium ores is discussed with respect to oxygen content of Precambrian atmospheres and of subsurface waters. The effect of subsequent metamorphism and recrystallization upon indigenous pyrites and kerogen is related. Finally characteristics of known uranium deposits are correlated to suggest a strategy to be employed while prospecting for undiscovered uranium ores. (DT)

0502 Exploration

9443 (GJBX—33(83)) Results of NURE detailed sampling in the Aiken County, South Carolina area. National Uranium Resource Evaluation program. Thayer, P.A. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Nov 1983. Contract AC13-76GJ01664;AC09-76SR00001. 121p. (DPST—81-141-36). NTIS, PC E09/MF $10.00. Order Number DE84005048.

Portions are illegible in microfiche products; Includes 27 sheets of 48x and 24x reduction microfiche.

This report documents results of detailed geological and geochemical studies in Aiken and Lexington Counties, South Carolina. The studies were undertaken in the spring of 1979 in order to determine the origin, abundance, and areal extent of uraniferous Carolina Coastal Plain. Gorceixite is a hydrated barium aluminum phosphate mineral. The identification fo gorceixite in Aiken County caused much interest because of the 75 to 960 ppM uranium associated with it. Gorceixite is a rare secondary mineral that was first reported as rolled pebbles in diamond sands of Brazil and Africa. Gorceixite has also been found in Dale Colunty, Alabama and Garland County, Arkansas. In Aiken County, South Carolina, gorceixite is found as thin seams or nodules interlayered with sands and mottled clays of the late Eocene (Jackson) Barnwell Group. Electron microprobe analysis of Aiken County gorceixite indicates that the relative abundances of major elements are: Ba>Al>P>Si, Sr>F>Fe>Ca. Also present in amounts greater than 0.05% are K, Ti, Y, La, and U. Ferguson et al. (1979) noted that the uranium in Aiken County gorceixite is in disequilibrium with its decay products, indicating relatively recent enrichment of uranium. Gamma-ray spectrometry measurements, which measure Bi-214, yield estimated concentrations of U_3O_8(eU_3O_8) of <5 to 20 ppM, whereas chemical analyses show much higher (75 to 960 ppM) concentrations.

0507 Fuels Production And Properties

REFER ALSO TO CITATION(S) 10278

9444 U-Si and U-Si-Al dispersion, fuel alloy development for research and test reactors. Domagala, R.F.; Thresh, H.R.; Wiencek, T.C. (Argonne National Laboratory, Materials Science and Technology Division, 9700 South Cass Avenue, Argonne, Illinois 60439). *Nuclear Technology;* 62: No. 3, 353-360(Sep 1983).

As part of the National Reduced Enrichment Research and Test Reactor Program, Argonne National Laboratory (ANL) is engaged in a fuel alloy development project. The reduction of the ^{235}U enrichment from above 90% to below 20% for such fuels would lessen the risk of diversion of the fuel for nonpeaceful uses. Fuel alloy powder prepared with low-enrichment uranium (<20% ^{235}U) is dispersed in an aluminum matrix, and metallurgically roll bonded within a cladding of 6061 aluminum alloy. Miniplates with up to 55 vol% fuel alloy (up to 7.0 g total U/cm^3) have been successfully fabricated. Fifty-five of these plates have been or are being irradiated in the Oak Ridge Research Reactor. Three fuel alloys have been used in the ANL miniplates: U_3Si(U + 4 wt% Si), U_3Si_2(U + 7.5 wt% Si), and "U_3SiAl" (U + 3.5 wt% Si + 1.5 wt% Al). All are candidates for permitting higher fuel loadings and thus lower enrichments of ^{235}U than would be possible with either UAl/SUB x/ or U_3O_8, the current fuels for plate-type elements. A target loading of up to 7.0 g U/cm$_3$ in the fuel zone was selected. To date the fabrication and irradiation results with the silicide fuels have been encouraging, and as an adjunct to the development effort, ANL is engaged in the early stages of technology transfer with commercial fabricators of fuel elements for research reactors. Continuing effort also involves the development of a technology for full-sized plate fabrication and the irradiation of miniplates to a burnup of about 90% ^{235}U depletion.

0508 Spent Fuels Reprocessing

REFER ALSO TO CITATION(S) 10309

9445 (CONF-8308150—1) Consolidated fuel reprocessing program: a guide for reliability and maintainability data acquisition. Haire, M.J.; Gift, E.H.;. (Oak Ridge National Lab., TN (USA); Oak Ridge Gaseous Diffusion Plant, TN (USA)). 1983. Contract W-7405-ENG-26. 13p. NTIS, PC A02/MF A01. Order Number DE84003407.

From Annual meeting of the Society for Risk Analysis; New York, NY, USA (1 Aug 1983).

The need to establish absolute values for availability risk assessments has added a new urgency to the collection of high quality reliability and maintainability data. This paper described a logical format for the collection of the required data and suitable data acquisition forms. An inventory and technical data form is filled at the time the design is finished or the equipment received. An event report is completed at each shutdown. Finally, a maintainability report is filed on resumption of normal operations. Parameter values required for a complete and comprehensive equipment system availability analysis are defined. Priorities are established for the collection of data of these parameters - data are classifed as basic, intermediate, or high quality. These data forms are designed such that a complete history of equipment and system uptime and downtime can be recorded systematically. 1 reference, 1 table.

9446 (DP—1664) Trioxane-initiated formic acid denitration. Reif, D.J.; Wright, W.V.; Monson, P.R. Jr. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Jul 1983. Contract AC09-76SR00001. 37p. NTIS, PC A03/MF A01. Order Number DE84005330.

The Savannah River Laboratory has developed a procedure for controlled low-temperature chemical denitration of acidic solutions. The procedure can be used in semi-continuous denitration facilities and can also be directly applied to nitric acid solutions in a storage tank (in situ denitration) if there is some provision for moderate heating (up to 80°C) and cooling. The procedure works well for both highly acidic (~ 11M) and moderately acidic (~ 3M) solutions. Trioxane, the cyclic trimer of formaldehyde, is used to initiate the reaction, while the bulk of the denitration is effected by the formic acid. Once initiated, the off-gas rate is controlled by the formic acid addition rate and can easily be maintained within the capacity limits of the off-gas system. The procedure was successfully applied to a plant-scale in situ denitration at the Savannah River Plant.

9447 (INIS-mf—8278) Fuel reprocessing: Citizens' questions and experts' answers. (Bayerisches Staatsministerium fuer Landesentwicklung und Umweltfragen, Muenchen (Germany, F.R.)). Oct 1982. 96p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704747.

In connection with the intention of DWK to erect a fuel reprocessing plant in the Oberpfalz, citizens have asked a great number of questions which are of interest to the general public. They have been collected, grouped into subject categories and answered by experts.

0509 Transport And Storage

REFER ALSO TO CITATION(S) 9455, 9476, 9477, 9496

9448 **(CEA-CONF—6776) Operational and regulatory outlook for the transport of radioactive material.** Sousselier, Y. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1983. 4p. (CONF-830528—64). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750289.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

Future actions to achieve overall optimization with reasonable economic constraints are discussed in this paper. The knowledge of data used for design calculations of packaging should be improved. Another sector is that of taking into consideration the whole interlinked series of operations involved and not just the transport. Future regulations need not be more and more restrictive and detailed, but more and more effective. In the administrative aspects of regulations the documents should be simplified and their number reduced but checklists should be more detailed to show that operations have been done corectly. Optimum conditions should be pursued in quality control. These recommendations can only be put in practice if the general public is convinced that transporting radioactive materials is perfectly safe and that optimum conditions are in their interest.

9449 **(CEA-CONF—6780) Transport of FBR spent fuels.** Geffroy; Dobremelle; Liot; Vallepin; Frachet. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 7p. (In French). (CONF-830528—66). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750319.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

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The transport of FBR spent fuels sets a thermal problem. The tests carried out by the C.E.A. allow to know with a good precision the temperatures reached during the transport. Graphs make possible to find satisfying solutions which allow not to rise above the technological limits of fixed temperatures.

9450 **(CEA-CONF—6794) How safety procedures can follow the evolution in transport of RAM.** Sousselier, Y.; Grenier, M. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1983. 3p. (CONF-830528—67). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750326.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

In 1968, in Gatlimburg, an universal Convention was pointed out. It should help to erase many of the legal difficulties encountered in the international Transportation of Radioactive Material. About 15 years later, they have changed a little, they are still changing, but their status stays the same, they are still a basis for Organizations and Countries, as for instance recently for the Regulation issued by ICAO. It seems interesting to examine, under the light of the practical evolution in transport of radioactive materials, whether such a convention is still wishable, and what are the discernible lines of force and overall the solutions we can imagine to the present problems. The present situation is mainly characterized by two essential features: an increasing internationalization of Transportation of Radioactive Materials; and a stronger desire of checking the safety not only in the design of the packaging but also to check and act on the real shipment and the real package.

9451 **(DOE/RW—0003) Initial implementation plan for deployment of federal interim storage facilities for commercial spent nuclear fuel.** (USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Civilian Radioactive Waste Management). Jan 1984. 11p. NTIS, PC A02/MF A01. Order Number DE84005074.

This report describes the generic approach the Department of Energy plans to take in deploying Federal Interim Storage (FIS) facilities, and the background considerations that have led to the development of this plan. As soon as the Department has firm information as to the source and quantities of any spent fuel eligible for FIS, it will proceed with a more specific plan, including identification of specific sites. In formulating its plans for deployment of FIS facilities, the Department has considered a number of alternative storage methods, sites, and transportation arrangements. 7 references.

9452 **(NUREG/CR—2325) Transportation of radioactive material (RAM) to and from US nuclear power plants. Draft environmental assessment.** Finley, N.C.; Luna, R.E.; Madsen, M.M.; McClure, J.D.; Wheeler, T.A.; Wilmot, E.L. (Sandia National Labs., Albuquerque, NM (USA)). Dec 1983. Contract AC04-76DP00789. 189p. (SAND—81-0118). NTIS, PC A09/MF A01 - GPO $6.00. Order Number DE84005652.

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This report analyzes the radiological consequences and risks of transporting radioactive material (RAM) to and from US nuclear power plants. The analysis defines risk paths along which the RAM transport occurs. Shipment information and unit-values of radiological consequence and risk are developed for each risk path and these are combined to determine annual radiological consequence for normal (incident-free) transportation and annual radiological risk due to RAM transport accidents. The results of the analysis are presented for the years 1985 and 1990. 33 references, 7 figures, 73 tables.

9453 **Transportation packagings for high-level wastes and unprocessed transuranic wastes.** Wilmot, E.L.; Romesberg, L.E. (Sandia National Laboratories, Albuquerque, NM). *American Society of Mechanical Engineers, [Paper]*; **82-NE-6**: 6(1982). (CONF-820705—).

From 2. joint ASME/ANS nuclear engineering conference; Portland, OR, USA (25 Jul 1982).

Packagings used for nuclear waste transport are varied in size, shape, and weight because they must accommodate a wide variety of waste forms and types. This paper discusses the common characteristics among the packagings in order to provide a broad understanding of packaging designs. It then discusses a packaging design that has been under development recently at Sandia National Laboratories (SNL) for handling unprocessed, contact-handled transuranic (CHTRU) wastes as well as a cask design for defense high-level wastes (HLW).

9454 **Transportation packaging for processed transuranic waste.** Andrews, W.B.; Alzheimer, J.M.; Jackson, W.B.; Jones, R.N. (Pacific Northwest Laboratory, Richland, WA). *American Society of Mechanical Engineers, [Paper]*; **82-NE-9**: 8(1982). (CONF-820705—). Contract AC06-76RL01830.

From 2. joint ASME/ANS nuclear engineering conference; Portland, OR, USA (25 Jul 1982).

This project was funded by the U.S. Department of Energy (DOE), through Sandia National Laboratories, Transportation Technology Center, at the Pacific Northwest Laboratory (PNL) to develop preconceptual package designs for transportation of processed TRU (PTRU) waste products with surface dose rates 2 mSv/hr (200 mR/hr). Four transportation container design concepts were developed. A Type A canister was designed for direct filling of PTRU waste. This package could be shipped under the Low Level Solids rules in proposed revisions to transportation regulations, or in a reusable Type B container. Two alternative reusable Type B container designs were developed for the Type A canister. The fourth concept is a disposable Type B package for direct filling by PTRU wastes.

0510 Marketing And Economics

REFER ALSO TO CITATION(S) 9466

0520 Waste Management

REFER ALSO TO CITATION(S) 9446, 9514, 9515, 9518, 9519, 9858, 9940, 10207, 10246, 10288, 10313, 10748, 10964, 10965, 10966, 10967, 10970

9455 **(AECL—7793) Fourth annual report of the Canadian Nuclear Fuel Waste Management Program.** Rosinger, E.L.J.; Dixon, R.S. (Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment). Dec 1982. 124p. AECL-Scientific Document Dist. Office, Chalk River, Ontario, Canada.

This report, the fourth of a series of annual reports, reviews the progress that has been made in the research and development program for the safe management and disposal of Canada's nuclear fuel waste. The report summarizes activities over the past year in the following areas: public interaction, used fuel storage and transportation, immobilization of used fuel and fuel recycle waste, geoscience research associated with deep underground disposal, environmental research, environmental and safety assessment. 167 references, 13 figures, 2 tables.

9456 **(AECL—7812) Evaluation of phyllosilicates as a buffer component in the disposal of nuclear fuel waste.** Oscarson, D.W.; Cheung, S.C.H. (Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment). Dec 1983. 44p. AECL-Scientific Document Dist. Office, Chalk River, Ontario, Canada $4.00.

The disposal concept now being assessed in the Canadian Nuclear Fuel Waste Management program entails the emplacement of containers with used fuel or fuel recycle waste deep in a stable plutonic formation, possibly in the Canadian Shield. One of the engineered barriers to radionuclide movement from the waste containers to the biosphere is a buffer material placed between the containers and the surrounding rock mass. An effective buffer material should have a combination of the following properties: low hydraulic conductivity and diffusivity for water and dissolved chemical species, a high sorption capacity for radionuclides, high thermal conductivity, sufficient physical strength to support the waste containers, and long-term stability under the conditions existing in a disposal vault. This report evaluates phyllosilicates for their effectiveness as potential buffer components. It concludes that bentonite, because of its high swelling potential, low hydraulic conductivity, low effective porosity, and high sorption capacity for many radionuclides, would be the most effective phyllosilicate for use as a buffer component. 54 references, 11 figures, 2 tables.

9457 **(ANL—83-57-Pt.2) Compatibility of technologies with regulations in the waste management of H-3, I-129, C-14, and Kr-85. Part II. Analysis.** Trevorrow, L.E.; Kolba, V.M.; Vandegrift, G.F.; Steindler, M.J. (Argonne National Lab., IL (USA)). Nov 1983. Contract W-31-109-ENG-38. 147p. NTIS, PC A07/MF A01. Order Number DE84005439.

Waste forms of ^{3}H, ^{129}I, ^{14}C, and ^{85}Kr separated from fuel reprocessing streams and procedures for managing them were analyzed regarding compliance with regulations. Transportation of these wastes in certain DOT-specification packagings would be permissible, but some of these packagings may not be acceptable in some disposal situations. Transportation of gaseous ^{85}Kr in a currently certified cylinder is possible, but a fuel reprocessor may wish to ship larger quantities per package. Disposal of tritium using a package designed by a DOE contractor and shallow land burial, in accord with the regulations of 10 CFR 61, seems practicable. Although 10 CFR 61 permits shallow land burial of ^{129}I, the concentration limit requires distribution in a volume that may seem impractical to commercial fuel reprocessors. The concentration limit of 10 CFR 61 for shallow land burial of ^{14}C requires distribution in a lesser, although still large, volume. For both ^{129}I and ^{14}C, management as high-level waste offers the advantage of smaller volumes. Similar advantages may be offered by greater confinement or non-near surface concepts for disposal. The concrete waste forms developed for these nuclides may not meet technical criteria being formulated for geologic disposal. The lack of accommodation of ^{85}Kr at disposal facilities makes storage of the gaseous form at the fuel reprocessing plant, followed by dispersal after partial decay, seem attractive. Ocean disposal of ^{129}I and ^{14}C by the rules of the International Atomic Energy Agency-London Ocean Dumping Convention offers advantages over shallow land burial: higher allowed concentrations, resulting in smaller volumes and fewer packages. These rules, however, thwart ocean disposal of ^{85}Kr since gaseous forms are banned, and for solid forms, concentration limits would require distribution of radioactivity in very large volumes. 80 references.

9458 **(CEA-CONF—6761) Glasses used for the high level radioactive wastes storage.** Sombret, C. (CEA Etablissement de la Vallee du Rhone, 30 - Bagnols-sur-Ceze (France)). Jun 1983. 14p. (In French). (CONF-8306146—6). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750329.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

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High level radioactive wastes generated by the reprocessing of spent fuels is an important concern in the conditioning of radioactive wastes. This paper deals with the status of the knowledge about glasses used for the treatment of these liquids.

9459 **(CEA-CONF—6768) Mechanical properties of some candidate glasses for high-level radioactive waste management.** Vernaz, E.; Deymier, P.; Jacquet-Francillon, N. (CEA Etablissement de la Vallee du Rhone, 30 - Bagnols-sur-Ceze (France)). Apr 1983. 17p. (CONF-830451—28). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750328.

From American Ceramic Society annual meeting; Chicago, IL, USA (25 Apr 1983).

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The biaxial flexure fracture stress, fracture toughness and Young's modulus were measured for different nuclear glass compositions. The KIC values of all the nuclear glasses tested ranged from 0.90 to 1.10 MPa.msup(1/2), slightly higher than for Pyrex. Crystallization and incorporation of simulated metallic fines had no detrimental effect.

9460 **(CEGB-P—21) Sizewell 'B' power station public inquiry: CEGB proof of evidence. The disposal of low level and intermediate level solid wastes.** Flowers, R. (Central Electricity Generating Board, London (UK)). Nov 1982. 45p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704585.

The role of NIREX (the Nuclear Industry Radioactive Waste Executive) in planning for the disposal of intermediate level waste and low level waste is explained. An inventory of such wastes in the UK is given and future arisings are estimated. Radioactive waste disposal routes currently available in the UK are described. The need for NIREX to increase these disposal facilities and plans for future operations are discussed.

9461 (CONF-821215—, pp 77-85) **Raffinate treatment at the Portsmouth Gaseous Diffusion Plant.** Acox, T.A. Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Raffinate solutions, which contain uranium, technetium, nitrates, and lesser amounts of heavy metals, are produced in the decontamination and uranium recovery operations at the Portsmouth Gaseous Diffusion Plant. These solutions are presently being placed in temporary storage until three treatment facilities are constructed which will produce an environmentally acceptable effluent from the raffinate. These facilities are: (1) The Heavy Metals Precipitation Facility; (2) The Technetium Ion Exchange Facility; and (3) The Biodenitrification Pilot Plant. When the facilities are completed, the raffinate will be treated in 500 gallon batches. The first treatment is the heavy metals precipitation by caustic addition and filtering. The effluent proceeds to the ion exchange columns where the technetium is removed by adsorption onto a strongly basic,

anion exchange resin which has been converted to the hydroxyl form. Following ion exchange, the solution is transported to the biodenitrification pilot plant. The biodenitrification column is a fluidized-bed using bacteria-laden coal particles as the denitrifying media. The resulting effluent should meet the limits established by the US EPA for all metals and nitrate. Technetium will be 98+% removed and the uranium concentration will be less than one milligram per liter. 13 references.

9462 (CONF-821215—, pp 141-152) **Destruction of uranium-contaminated waste oil.** Hary, L.F. (Goodyear Atomic Corp., Piketon, OH). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Due to the environmental concerns associated with open-field biodegradation of uranium-contaminated waste oil at the Portsmouth Gaseous Diffusion Plant and the projected increased generation of uranium-contaminated waste oil, studies were conducted to better characterize the waste oil and to determine the optimum biodegradation conditions for disposal of these oils by the currently used landfarming method. The following biodegradation prarmeters were examined in the optimization studies: microbial strains, soil media, nutrient requirements, and degradation environment (e.g., temperature, moisture). Additional studies were conducted to determine the feasibility and effectiveness of the open-field landfarming as compared with a proposed greenhouse-like enclosure for the landfarming plots which would also operate using the optimized biodegradation parameters. The conclusions of these studies are that open-field landfarming biodegradation of waste oil under optimum conditions is an environmentally acceptable and cost effective disposal method. A comparison was made between the biodegradation disposal method and incineration, a more extensively used method for disposal of waste oils. Included in the comparison are discussions on the physical and chemical characteristics of the waste oil and the effects of these characteristics on the use of the alternative methods. 8 references, 4 figures, 2 tables. (JMT)

9463 (CONF-821215—, pp 163-170) **Detailed site study phase: an environmental approach to planning and design.** Brown, M.L. Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

This paper describes the planning of detailed studies that will aid in determining the suitability of a site for development as a high-level nuclear waste repository. Environmental considerations weighed heavily in planning and design of this phase of exploratory work. Some background information is presented first to acquaint the reader with a purpose of the overall radioactive waste repository program. The plan for siting repositories is then summarized as part of the general background information to place the Detailed Site Study Phase in proper perspective. The detailed site study phase is described in more detail, including information on the schedule, activities, and reports that will document the process. Finally, the interaction between environmental scientists and design engineers is described and results of that interaction discussed. 3 references. (ACR)

9464 (CONF-821215—, pp 181-188) **Nuclear waste disposal and NEPA compliance.** Smith, B.H.; Brown, M.L. Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The Nuclear Waste Terminal Storage (NWTS) NEPA Program for siting high-level radioactive waste repositories is discussed. This program was developed in response to the requirements of the National Environmental Policy Act (NEPA), Council of Environmental Quality Regulations (CEQ) for implementing the Procedural Provisions of the National Environmental Policy Act, and DOE Guidelines for Compliance with the National Environmental Policy Act (DOE Guidelines). The paper addresses the following: the requirements of NEPA and implementing regulations, the NWTS Program plan for meeting these requirements, the implementation of the NWTS NEPA Program, and the possible changes to the NWTS NEPA Program if nuclear waste management is enacted. 9 references. (JMT)

9465 (CONF-821215—, pp 387-398) **Improvements to environmental surveillance at the Radioactive Waste Management Complex (RWMC) of the Idaho National Engineering Laboratory.** Moor, K.S.; Rope, S.K.; Wiersma, G.B.; Smith, T.H. (Idaho National Engineering Lab., Idaho Falls). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Environmental monitoring has been conducted throughout the 30 years of RWMC operations at the INEL. Monitoring data collected during this time provide a record of the effect of the RWMC on the surrounding environment. A Monitoring Activities Review (MAR) is being conducted: (1) to review the methods used in the current program and upgrade them as required to state-of-the-art, and (2) to review the data accumulated to date in order to detect trends and determine whether revised sampling designs are needed. Results of the MAR will be used to modify the Program. Critical environmental pathways are being identified using a comprehensive pathways approach. The use of system analysis, including simple pathway models based on first order kinetics, is an excellent way to design monitoring networks and analyze monitoring data. This allows investigators and administrators to consider interactions that may be occurring in the system, and provide guidance in determining the relative importance of collecting and analyzing various media. The desirability of achieving certain confidence levels versus cost can then be evaluated. This systematic approach is described in this paper. 6 references, 3 figures.

9466 **(CONF-831217—8) Economics of mined geologic repositories.** Hofmann, P.L.; Dippold, D.G. (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1983. Contract AC02-83CH10140. 6p. NTIS, PC A02/MF A01. Order Number DE84005287.

From 5. civilian radioactive waste management information meeting; Washington, DC, USA (12 Dec 1983).

During 1982, Congress considered legislation to provide for the development of repositories for the disposal of high-level radioactive waste and spent nuclear fuel. The result of this legislative effort was the Nuclear Waste Policy Act of 1982 (NWPA), PL 97-425, signed into law January 7, 1983. An important part of the NWPA was the establishment of special funds in the US Treasury for Waste Disposal and Interim Storage to be financed by user fees to pay for all costs of the program. An initial fee of 1.0 mill per kilowatt-hour was specified. The Secretary was asked to annually review the amount of the fees established... to evaluate whether collection of the fee will provide sufficient revenues to offset the costs... In the event of a prospective fee cost mismatch, the Secretary was asked to propose an adjustment to the fee to insure full cost recovery. A series of studies were sponsored by DOE in 1982 to estimate program costs, to calculate the necessary fees to assure cost recovery, and to address uncertainties that could affect future program costs and consequent fee schedules. A brief summary of the 1982 cost estimates is presented. Sources of key cost uncertainties are discussed and the bases for the cost recovery fee calculations are summarized. 17 references, 2 figures, 3 tables.

9467 **(CONF-831217—10) Salt site performance assessment activities.** Kircher, J.F.; Gupta, S.K. (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1983. Contract AC02-83CH10140. 8p. NTIS, PC A02/MF A01. Order Number DE84005292.

From 5. civilian radioactive waste management information meeting; Washington, DC, USA (12 Dec 1983).

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During this year the first selection of the tools (codes) for performance assessments of potential salt sites have been tentatively selected and documented; the emphasis has shifted from code development to applications. During this period prior to detailed characterization of a salt site, the focus is on bounding calculations, sensitivity and with the data available. The development and application of improved methods for sensitivity and uncertainty analysis is a focus for the coming years activities and the subject of a following paper in these proceedings. Although the assessments to date are preliminary and based on admittedly scant data, the results indicate that suitable salt sites can be identified and repository subsystems designed which will meet the established criteria for pro-

tecting the health and safety of the public. 36 references, 5 figures, 2 tables.

9468 **(CONF-831217—12) Plans for characterization of salt sites.** Heim, G.E.; Matthews, S.C.; Kircher, J.F.; Kennedy, R.K. (Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation). 1983. Contract AC02-83CH10140. 9p. NTIS, PC A02/MF A01. Order Number DE84005291.

From 5. civilian radioactive waste management information meeting; Washington, DC, USA (12 Dec 1983).

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This basic salt site characterization program has been designed to provide the data required to support the design, performance assessment, and licensing of each of the principal project elements: the repository, the shafts, and the surface facilities. The work has been sequenced to meet the design and licensing schedule. It is anticipated that additional characterization activities will be performed to address site-specific considerations and to provide additional information to address questions which arise during the evaluation of characterization data. 3 figures, 3 tables.

9469 **(CONF-8311125—1) ORNL grouting technologies for immobilizing hazardous wastes.** Dole, L.R.; Trauger, D.B. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 3p. NTIS, PC A02/MF A01. Order Number DE84003282.

From Mid-south conference on hazardous waste; Memphis, TN, USA (7 Nov 1983).

The Cement and Concrete Applications Group at the Oak Ridge National Laboratory (ORNL) has developed versatile and inexpensive processes to solidify large quantities of hazardous liquids, sludges, and solids. By using standard off the shelf processing equipment, these batch or continuous processes are compatible with a wide range of disposal methods, such as above-ground storage, shallow-land burial, deep geological disposal, sea-bed dumping, and bulk in-situ solidification. Because of their economic advantages, these latter bulk in-situ disposal scenarios have received the most development. ORNL's experience has shown that tailored cement-based formulas can be developed which tolerate wide fluctuations in waste feed compositions and still maintain mixing properties that are compatible with standard equipment. In addition to cements, these grouts contain pozzolans, clays and other additives to control the flow properties, set-times, phase separations and impacts of waste stream fluctuation. The cements, fly ashes and other grout components are readily available in bulk quantities and the solids-blends typically cost less than $0.05 to 0.15 per waste gallon. Depending on the disposal scenario, total disposal costs (material, capital, and operating) can be as low as $0.10 to 0.50 per gallon.

9470 **(DOE/OR/20722—1) Engineering evaluation of alternatives for the disposition of Niagara Falls Storage Site, its residues and wastes.** (Bechtel National, Inc., Oak Ridge, TN (USA)). Jan 1984. Contract AC05-81OR20722. 217p. NTIS, PC A10/MF A01. Order Number DE84005778.

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The final disposition scenarios selected by DOE for assessment in this document are consistent with those stated in the Notice of Intent to prepare an Environmental Impact Statement (EIS) for the Niagara Falls Storage Site (NFSS) (DOE, 1983d) and the modifications to the alternatives resulting from the public scoping process. The scenarios are: take no action beyond interim remedial measures other than maintenance and surveillance of the NFSS; retain and manage the NFSS as a long-term waste management facility for the wastes and residues on the site; decontaminate, certify, and release the NFSS for other use, with long-term management of the wastes and residues at other DOE sites; and partially decontaminate the NFSS by removal and transport off site of only the more radioactive residues, and upgrade containment of the remaining wastes and residues on site. The objective of this document is to present to DOE the conceptual engineering, occupational radiation exposure, construction schedule, maintenance and surveillance requirements, and cost information relevant to design and implementation of each of the four scenarios. The specific alternatives within each scenario used as the basis for discussion in this document were evaluated on the bases of engineering considerations, technical feasibility, and regulatory requirements. Selected alternatives determined to be acceptable for each of the four final disposition scenarios for the NFSS were approved by DOE to be assessed and costed in this document. These alternatives are also the subject of the EIS for the NFSS currently being prepared by Argonne National Laboratory (ANL). 40 figures, 38 tables.

9471 **(DOE-RW—81.002) Corrosion problems related to the containment of high-level nuclear waste for disposal.** Rothwell, G.P. (National Physical Lab., Teddington (UK)). 1 Oct 1981. 30p. Available from British Library Lending Division, Boston Spa, Wetherby, West Yorks.

The subject is examined under the headings: introduction (nature of problem; system of barriers which will initially contain the wasteform and subsequently limit the rate of transport of products from the wasteform to the external environment); environmental data (disposal in land-based repositories; disposal on or in the deep seabed); design philosophies and materials data (design; criteria for materials selection (kinetics of corrosion)); specific materials considerations (environmental parameters -temperature, pressure, heat transfer and radiation effects; single metals and alloys - steels, nickel based alloys, copper, lead, titanium, aluminium oxide); alternative approaches; an overview - information needs; summary.

9472 **(DP-MS—83-71) Cement-based waste forms for disposal of Savannah River Plant low-level radioactive salt waste.** Langton, C.A.; Dukes, M.D.; Simmons, R.V. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1983. Contract AC09-76SR00001. 9p. (CONF-831174—61). NTIS, PC A02/MF A01. Order Number DE84005197.

From Materials Research Society annual meeting; Boston, MA, USA (14 Nov 1983).

Defense waste processing at the Savannah River Plant will include decontamination and disposal of approximately 100 million liters of soluble salts containing primarily $NaNO_3$, NaOH, $NaNO_2$, $NaAl(OH)_4$, and Na_2SO_4. A cement-based waste form, saltstone, has been designed for disposal of Savannah River Plant low-level radioactive salt waste. Bulk properties of this material have been tailored with respect to salt leach rate, permeability, and compressive strength. Microstructure and mineralogy of leached and unleached specimens were characterized by SEM and x-ray diffraction analyses, respectively. It has been concluded that the salt leach rate can be limited so that amounts of salt and radionuclides in the groundwater at the perimeter of the 100-acre disposal site will not exceed EPA drinking water standards. 7 references, 4 figures, 6 tables.

9473 **(DP-MS—83-108) Electrokinetic effects and the concepts of zeta potential and zero point of charge.** Jantzen, C.M. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1983. Contract AC09-76SR00001. 17p. (CONF-821266—1). NTIS, PC A02/MF A01. Order Number DE84003690.

From 3. semi-annual workshop on the leaching mechanisms of defense high-level waste forms; Thousand Oaks, CA, USA (7 Dec 1982).

The application of electrokinetic effects and the concepts of zeta potential and zero point of charge to leaching of radioactive waste glasses is discussed. 24 references, 2 figures, 3 tables.

9474 **(DP-MS—83-110) Solidification of Savannah River Plant high-level waste.** Maher, R.; Shafranek, L.F.; Stevens, W.R. III. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 1983. Contract AC09-76SR00001. 35p. (CONF-8311117—1). NTIS, PC A03/MF A01. Order Number DE84002663.

From American Institute of Chemical Engineers meeting; Washington, DC, USA (4 Nov 1983).

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The Department of Energy, in accord with recommendations from the Du Pont Company, has started construction of a Defense Waste Processing Facility (DWPF) at the Savannah River Plant. The facility should be completed by the end of 1988, and full-scale operation should begin in 1990. This facility will immobilize in borosilicate glass the large quantity of high-level radioactive

waste now stored at the plant plus the waste to be generated from continued chemical reprocessing operations. The existing wastes at the Savannah River Plant will be completely converted by about 2010. 21 figures.

9475 **(DPSP—83-17-8) Salt decontamination demonstration test results.** Snell, E.B.; Heng, C.J. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)). Jun 1983. Contract AC09-76SR00001. 21p. NTIS, PC A02/MF A01. Order Number DE84005194.

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The Salt Decontamination Demonstration confirmed that the precipitation process could be used for large-scale decontamination of radioactive waste sale solution. Although a number of refinements are necessary to safely process the long-term requirement of 5 million gallons of waste salt solution per year, there were no observations to suggest that any fundamentals of the process require re-evaluation. Major accomplishments were: (1) 518,000 gallons of decontaminated filtrate were produced from 427,000 gallons of waste salt solution from tank 24H. The demonstration goal was to produce a minimum of 200,000 gallons of decontaminated salt solution; (2) cesium activity in the filtrate was reduced by a factor of 43,000 below the cesium activity in the tank 24 solution. This decontamination factor (DF) exceeded the demonstration goal of a DF greater than 10,000; (3) average strontium-90 activity in the filtrate was reduced by a factor of 26 to less than 10^3 d/m/ml versus a goal of less than 10^4 d/m/ml; and (4) the concentrated precipitate was washed to a final sodium ion concentration of 0.15 M, well below the 0.225 M upper limit for DWPF feed. These accomplishments were achieved on schedule and without incident. Total radiation exposure to personnel was less than 350 mrem and resulted primarily from sampling precipitate slurry inside tank 48. 3 references, 6 figures, 2 tables.

9476 **(GA-A—16839) Comparison of cask and dry well storage concepts for a stand-alone monitored retrievable storage/interim storage system.** Ganley, J.; Griffin, R.; Ligon, D.; Morissette, R.; Seth, S.; Sterling, S.; Tupper, M.; Young, K. (General Atomic Co., San Diego, CA (USA)). Sep 1982. Contract AT03-81SF11528. 279p. NTIS, PC A13/MF A01. Order Number DE84005201.

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Metal storage casks are compared with surface dry wells for storage of spent fuel or solidified high-level wastes. Conceptual designs of monitored retrievable storage/interim storage (MRS/IS) facilities are described and evaluated for both storage concepts. The MRS/IS facilities include systems and storage facilities for transuranic (TRU) waste. The impact of TRU waste on the MRS/IS facility is evaluated. Comparisons of the storage concepts were made for three cases for which different reprocessing and disposal schedules were assumed, thus affecting the size and handling rate of the MRS/IS facility. In all cases, dry wells were more economical than metal storage casks. 6 references, 51 figures, 51 tables.

9477 **(GA-A—17009) Impact of TRU waste storage on a stand-alone MRS facility.** Griffin, R.E.; Ganley, J.T. (GA Technologies, Inc., San Diego, CA (USA)). Nov 1983. Contract AT03-81SF11528. 51p. NTIS, PC A04/MF A01. Order Number DE84005203.

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A study was made of the impact of transuranic (TRU) waste storage on the conceptual design of a stand-alone Monitored Retrievable Storage (MRS) facility. The amount of TRU waste requiring storage is related to the startup dates of the reprocessing plant and the final repository. Current technology is available to store TRU waste from lightwater reactor (LWR) fuel reprocessing and mixed oxide (MOX) fuel refabrication safely and economically. Unit capital costs for TRU waste storage are in the range 7 to 10 $/kg of heavy metal. 7 references, 13 figures, 16 tables.

9478 **(HEDL-SA—3016FP) Spent fuel cladding containment credit test.** Wilson, C.N. (Hanford Engineering Development Lab., Richland, WA (USA)). 20 Sep 1983. Contract AC06-76FF02170. 25p. (CONF-8310232—1). NTIS, PC A02/MF A01. Order Number DE84004867.

From NRC-NNWSI waste package workshop; Dublin, CA, USA (18 Oct 1983).

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As an initial step in addressing the effectiveness of breached cladding as a barrier to radionuclide release from the repository during the post-containment period, preliminary scoping tests have been initiated which compare radionuclide releases from spent fuel specimens with artificially induced cladding defects of various severities. The artificially induced defects are all more severe than the typical in-reactor type breaches which are expected to be the principal type of breach entering the repository for terminal storage. These preliminary scoping tests being conducted by Westinghouse Hanford Company for the Lawrence Livermore National Laboratory Waste Package Development Program in support of the Tuff repository project at the Nevada Test Site are described. Also included in this presentation are selected initial results from these tests. 22 figures.

9479 **(IAEA-TECDOC—285) Characteristics of radioactive waste forms conditioned for storage and disposal: Guidance for the development of waste acceptance criteria. Report by an advisory group meeting on conditioning requirements for storage and disposal of radioactive wastes organized by the IAEA and held in Vienna, 23-27 August 1982.** (International Atomic Energy Agency, Vienna (Austria)). Apr 1983. 47p. (CONF-8208158—). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704589.

From IAEA meeting on conditioning requirements for storage and disposal of radioactive wastes; Vienna, Austria (23 Aug 1982).

This report attempts to review the characteristics of the individual components of the waste package, i.e. the waste form and the container, in order to formulate, where appropriate, quidelines for the development of practical waste acceptance criteria. Primarily the criteria for disposal are considered, but if more stringent criteria are expected to be necessary for storage or transportation prior to the disposal, these will be discussed. The report will also suggest test areas which will aid the development of the final waste acceptance criteria.

9480 **(IAEA-WMRA—14) Waste management research abstracts no. 14.** (International Atomic Energy Agency, Vienna (Austria)). Apr 1983. 288p. NTIS (US Sales Only), PC A13/MF A01. Order Number DE83704586.

The present 14th issue is the second of the new series of Waste Management Research Abstracts, which are reappearing after a three-year suspension. The new series appears in a substantially innovated form. Although the objective of the publication is the same as before, namely to collect and disseminate information on research in progress in the field of nuclear waste management, the format for presentation of the information is a new data sheet in a standardized form, access to which will be made possible by different indexes. The 408 research data sheets contained in this issue have been collected during recent months, ending 15 January 1983, and reflect research currently in progress. They were sent by the Governments of twenty-five Member States, by the International Atomic Energy Agency, and by the Commission of the European Communities. Though the information contained in this publication covers a wide range of subjects in various countries, the WMRA should not be interpreted as providing a complete survey of ongoing research in IAEA Member States.

9481 **(LA-UR—83-3402) Studies of altered vitrophyre for the prediction of nuclear waste repository - induced thermal alteration at Yucca Mountain, Nevada.** Levy, S.S. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 9p. (CONF-8311124—1). NTIS, PC A02/MF A01. Order Number DE84003827.

From 7. international symposium on the scientific basis for nuclear waste management; Boston, MA, USA (14 Nov 1983).

Nuclear waste emplacement in devitrified volcanic tuff at Yucca Mountain will raise the temperature of surrounding rock for a geologically significant period of time. This study evaluates the susceptibility of an underlying 50-ft-thick vitrophyre to thermal alteration by examining alteration that occured in the rock as it cooled after deposition. A 10°C temperature rise should have no

mineralogical effects on the vitrophyre, but an increase of 60° or more is likely to result in alteration. Expected mineralogic changes in the vitrophyre caused by this amount of thermal loading include crystallization of zeolites and smectite. Alteration will be concentrated of zeolites and smectite. Alteration will be concentrated in a thin interval near the top of the vitrophyre and along fractures. Adsorbed water and water in preexisting hydrous minerals and in glass may contribute to hydrothermal alteration of underlying vitrophyre. Bulk porosity change would be slight and local porosity increase would probably be restricted to the upper part of the vitrophyre. Although some fracture filling could occur, such a minor sealing effect would be balanced by development of secondary porosity. Zeolites and smectite, newly-crystallized along fluid flow paths below the waste repository, could provide an enhanced sorptive barrier to radionuclide migration. 21 references, 3 figures.

9482 **(LBL—16732) Thermodynamic coupling of heat and matter flows in near-field regions of nuclear waste repositories.** Carnahan, C.L. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 10p. (CONF-831174—56). NTIS, PC A02/MF A01. Order Number DE84004651.

From Materials Research Society annual meeting; Boston, MA, USA (14 Nov 1983).

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In near-field regions of nuclear waste repositories, thermodynamically coupled flows of heat and matter can occur in addition to the independent flows in the presence of gradients of temperature, hydraulic potential, and composition. The following coupled effects can occur: thermal osmosis, thermal diffusion, chemical osmosis, thermal filtration, diffusion thermal effect, ultrafiltration, and coupled diffusion. Flows of heat and matter associated with these effects can modify the flows predictable from the direct effects, which are expressed by Fourier's law, Darcy's law, and Fick's law. The coupled effects can be treated quantitatively together with the direct effects by the methods of the thermodynamics of irreversible processes. The extent of departure of fully coupled flows from predictions based only on consideration of direct effects depends on the strengths of the gradients driving flows, and may be significant at early times in backfills and in near-field geologic environments of repositories. Approximate calculations using data from the literature and reasonable assumptions of repository conditions indicate that thermal-osmotic and chemical-osmotic flows of water in semipermeable backfills may exceed Darcian flows by two to three orders of magnitude, while flows of solutes may be reduced greatly by ultrafiltration and chemical osmosis, relative to the flows predicted by advection and diffusion alone. In permeable materials, thermal diffusion may contribute to solute flows to a smaller, but still significant, extent.

9483 **(NUREG—0804) Staff analysis of public comments on proposed rule 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research). Dec 1983. 996p. NTIS, PC A99/MF A01 - GPO $15.00. Order Number DE84900591.

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On February 25, 1981, the Nuclear Regulatory Commission published rules which establish procedures for the licensing of geologic disposal, by the US Department of Energy, of high-level radioactive wastes. On July 8, 1981, proposed technical criteria which would be used in the evaluation of license applications under those procedural rules were published in the Federal Register. The Commission received 93 comment letters on the proposed technical criteria, 89 of which were received in time for the Commission to consider in preparing the final technical criteria which were published on June 21, 1983. This document presents a detailed analysis of the comments received on the proposed rule by the Commission's staff and also contains the Rationale for the Performance Objectives of 10 CFR Part 60.

9484 **(NUREG/CR—3427-Vol.2) Long-term performance of materials used for high-level waste packaging. Second quarterly report, year two, July 1983-September 1983. Volume 2.** Stahl, D.; Miller, N.E. (comps.). (Battelle Columbus Labs., OH (USA)). Dec 1983. 103p. NTIS, PC A06/MF A01 - GPO $4.75. Order Number DE84900667.

As part of the Nuclear Regulatory Commission's preparation to assess the Department of Energy's application to construct geologic repositories for high-level radioactive waste disposal, Battelle's Columbus Laboratories is investigating the long-term performance of materials used for high-level waste packages. Data were obtained this quarter on waste glass leaching/dissolution, and efforts to obtain other waste forms continue. A bonding structure has been proposed for the incorporation of B_2O_3 into silicate glass. Studies of internal canister corrosion indicate that zinc may affect the attack of stainless steel exposed to waste glass at elevated temperatures. Groundwater corrosion studies of titanium were completed during this quarter. Data on corrosion of steel in basalt groundwater were obtained. Hydrogen embrittlement tests on annealed material have been performed. Evaluations of prototypical hydrogen fugacities are under way. An experimental verification of the refined general-corrosion correlation is proposed, and calculations on groundwater radiolysis and gamma transport/energy deposition are under way. The description of water chemistry has been expanded. Internal corrosion and leaching experiments have been modified in the accelerated test planning/statistics task. This report documents investigations performed during July-September, 1983. 36 references, 28 figures, 23 tables.

9485 **(NUREG/CR—3570) Low-level nuclear waste shallow land burial trench isolation. Annual report, October 1982-September 1983.** McCray, J.G.; Nowatzki, E.A.; Van Zyl, D.; Thompson, G.H.; Armstrong, G. (Arizona Univ., Tucson (USA). Dept. of Nuclear and Energy Engineering). Dec 1983. 60p. NTIS, PC A04/MF A01 - GPO $4.50. Order Number DE84900593.

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The scope of this work includes an evaluation of certain trench cap designs, trench construction methods and trench loading utilizing structural and hydraulic monitoring methods under the stress conditions of an artificially created void space in the trenches representing decomposed waste. During the period of this report monitoring was continued on three (3) trenches at Mount Lemmon, Arizona and, in addition, a new trench was constructed with a wick design similar to those being tested in another USNRC project at Sheffield, Illinois. The new trench (Trench No. 5) also contains an improved soil beam design. Conclusions to date indicate that trench caps relying on either a single layer of fabric reinforcement or a non-reinforced soil beam will result in some eventual cap failure. The soil beam or soil arch are, alone, insufficient designs to prevent cap failure. There is insufficient data, as yet, to evaluate the soil cement reinforced beam. On the positive side, the experiment has demonstrated the value and use of tracers in understanding water movement in and around the trenches. Further monitoring will provide a better understanding of the cap failure mechanisms. 18 references, 17 figures, 13 tables.

9486 **(NVO—196-38) Nevada Nuclear Waste Storage Investigations. Quarterly report, April-June 1983.** (USDOE Nevada Operations Office, Las Vegas). Dec 1983. 87p. NTIS, PC A05/MF A01. Order Number DE84005313.

The section of the Total System Performance Assessment Code that simulates one-dimensional flow in unsaturated and saturated materials has been completed and checked. Results of detailed neutron activation analyses for major and trace elements in Topopah Spring tuff, the Tuffaceous Beds of Calico Hills, and G-Tunnel Grouse Canyon tuff were obtained. Preliminary results of coupon tests at 100°C in tuff-conditioned water show that carbon and alloy steels corrode at low rates due to the low oxygen level in boiling water. Waste package cost comparisons were made for vertical versus horizontal emplacement, using overpacks versus no overpacks, emplacement costs with or without backfill, and the effect of drift spacing for vertical emplacement. Preliminary analysis of the deep crustal structure as interpreted from 1981-1982 seismic refraction data from Yucca Mountain, Crater Flat, and the Bullfrog Hills was completed. Drilling of a series of holes to assist in further defining the water table at Yucca Mountain was started. The flatjack initialization (restoration of original natural conditions) phase of the Heated Block Experiment in G-Tunnel was completed and ambient temperature testing was commenced. Data from unconfined mechanical tests on a large stratigraphic interval of Yucca Mountain tuffs indicated that effective porosity was the best predictor of un-

confined compressive strength and Young's modulus, while Poisson's ratio is best predicted using a combination of effective porosity and grain density. Spent fuel retrieval operations from the Spent Fuel Test-Climax test facility were completed on April 6, and the last three spent fuel canisters were received at the E-MAD Facility and placed in the Hot Bay lag storage pits. Gas samples taken monthly from the Fuel Temperature Test canisters indicate the presence of increasing amounts of ^{85}Kr and a depletion of free oxygen in the system.

9487 **(ORNL/TM—8376) Final report on the decontamination of the Curium Source Fabrication Facility.** Schaich, R.W. (Oak Ridge National Lab., TN (USA)). Dec 1983. Contract W-7405-ENG-26. 33p. NTIS, PC A03/MF A01. Order Number DE84004015.

The Curium Source Fabrication Facility (CSFF) at Oak Ridge National Laboratory (ORNL) was decontaminated to acceptable contamination levels for maintenance activities, using standard decontamination techniques. Solid and liquid waste volumes were controlled to minimize discharges to the ORNL waste systems. This program required two years of decontamination effort at a total cost of approximately $700K. 5 references, 7 figures, 2 tables.

9488 **(PNL—4938) International program to study subseabed disposal of high-level radioactive wastes.** Carlin, E.M.; Hinga, K.R.; Knauss, J.A. (Pacific Northwest Lab., Richland, WA (USA)). Jan 1984. Contract AC06-76RL01830. 60p. NTIS, PC A04/MF A01. Order Number DE84005230.

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This report provides an overview of the international program to study seabed disposal of nuclear wastes. Its purpose is to inform legislators, other policy makers, and the general public as to the history of the program, technological requirements necessary for feasibility assessment, legal questions involved, international coordination of research, national policies, and research and development activities. Each of these major aspects of the program is presented in a separate section. The objective of seabed burial, similar to its continental counterparts, is to contain and to isolate the wastes. The subseabed option should not be confuesed with past practices of ocean dumping which have introduced wastes into ocean waters. Seabed disposal refers to the emplacement of solidified high-level radioactive waste (with or without reprocessing) in certain geologically stable sediments of the deep ocean floor. Specially designed surface ships would transport waste canisters from a port facility to the disposal site. Canisters would be buried from a few tens to a few hundreds of meters below the surface of ocean bottom sediments, and hence would not be in contact with the overlying ocean water. The concept is a multi-barrier approach for disposal. Barriers, including waste form, canister, ad deep ocean sediments, will separate wastes from the ocean environment. High-level wastes (HLW) would be stabilized by conversion into a leach-resistant solid form such as glass. This solid would be placed inside a metallic canister or other type of package which represents a second barrier. The deep ocean sediments, a third barrier, are discussed in the Feasibility Assessment section. The waste form and canister would provide a barrier for several hundred years, and the sediments would be relied upon as a barrier for thousands of years. 62 references, 3 figures, 2 tables.

9489 **(SKBF-KBS-TR—82-12) Diffusion in crystalline rocks of some sorbing and nonsorbing species.** Skagius, K.; Neretnieks, I. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). 1 Mar 1983. 46p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704590.

Laboratory experiments to determine the sorption and the rate of diffusion of cesium and strontium in pieces of granite have been performed. The effective diffusivity, D sub (p) x E sub (p) was found to be 1 - 2 x 10^{-12} m^2/s for both cesium and strontium. The diffusion of non-sorbing species in granites and other rock materials have been studied in laboratory scale. The non-sorbing species were iodide, tritiated water, Cr-EDTA and Uranine. In granites the effective diffusivities were determined to be 0.7-1.3 x 10^{-13} m^2/s for iodide and 1.3 - 1.8 x 10^{-13} m^2/s for tritiated water. Electrical resistivity measurements in salt water saturated rock cores have been performed. The resistivity is measured in the saturated core and in the salt solution with which the core has been saturated. The ratio between these two resistivities has a direct relation to the ratio of the effective diffusivity for a component in the rock material and the diffusivity in free water for the same component. The results from the electrical resistivity measurements and the experiments with diffusion of non-sorbing species are in fair agreement. The effective diffusivity for cesium and strontium (sorbing species) are, however, more than ten times higher than expected from the results of diffusion of non-sorbing species and the electrical resistivity measurements. This is interpreted as an effect of surface diffusion.

9490 **(SKBF-KBS-TR—82-15) Radioactive disequilibria in mineralised drill core samples from the Bjoerklund uranium occurence, northern Sweden.** Smellie, J.A.T. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Dec 1982. 33p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704591.

Forming the basis of a pilot study to investigate the natural mobility of uranium and its daughter products within the geological environment, a series of six samples, chosen from two mineralised fracture zones at depths of 100-130m within a homogeneous leucocratic granite, were examined mineralogically and isotopically to establish the presence or absence of radioactive equilibrium that may indicate recent rock/water interaction processes (i.e. during the last 0.5 m.y.). The results show clear evidence of radioactive disequilibrium, and hence recent rock/water interaction, in four of the six samples. Some is attributable mostly to solution-solid ^{234}U recoil gain (weakly mineralised zones adjacent to the main mineralisation) and others to solid-solution ^{234}U recoil loss (moderate to highly mineralised zones). The richer type of impregnation mineralisation indicates apparent radioactive equilibrium. The absence of significant ^{238}U loss in the samples helps to underline the reducing conditions prevalent within open fracture systems at these depths. This has meant that uraninite, now found in fractured rock at about 100m depth, has been chemically stable in its environment for most, if not all, of its 1750 m.y. existence, including the last 0.5 m.y. when it has been closest to the atmosphere. This could indicate that spent nuclear fuel, which essentially is crystalline UO_2, and comparable to uraninite once the main fission products have decayed, would also have been stable in this environment for similar periods of time.

9491 **(SKBF-KBS-TR—83-02) Possible effects of alpha and beta radiolysis on the matrix dissolution of spent nuclear fuel.** Grenthe, I.; Puigdomenech, I.; Bruno, J. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Jan 1983. 39p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704588.

The effects of oxidants on the retainment of actinides in a nuclear repository have been modelled by using an equilirium procedure. The oxidants are formed as a result of α- and β-radiolysis when spent nuclear fuel is exposed to ground water. From an equilibrium point of view, the strongest reductants in the system (Zr, Pb and Cu) are expected to be oxidized first, leaving the actinides in the oxidation states they have in the fuel matrix. This is expected to result in a negligible mobilization of the actinides due to the very low solubility of the MO_2 oxides. However, the formation of protective layers of oxides will most likely decrease the effectiveness of the metallic reducing agents. This will lead to an increased oxidation of the spent fuel which results in an increased actinide mobilization. The results of the equilibrium calculations show that the oxidation of the fuel matrix results in the formation of $UO_2(OH)_2(s)$ and to the formation of the soluble complex $UO_2(CO_3)_3^{4-}$. The transport of uranium is limited by the total concentration of carbonate in the aqueous phase. Neptunium may be quantitatvely solubilized as various Np(V) species and transported by ground water from the repository. Plutonium is retained at the repository site as insoluble PuO_2. Only very small amounts are transported by ground water. The mobile actinoids may be reprecipitated when they encounter reducing conditions along the flow path. The conditions for repricipitation for typical ground water compositions have been modelled by using solubility diagrams.

9492 **(UCID—19968) Summary of computational support and general documentation for computer code (GENTREE) used in Office of Nuclear Waste Isolation Pilot Salt Site Selection Project.** Beatty, J.A.; Younker, J.L.; Rousseau, W.F.; Elayat, H.A. (Lawrence Livermore National Lab., CA (USA)). 6 Dec 1983. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE84005111.

A Decision Tree Computer Model was adapted for the purposes of a Pilot Salt Site Selection Project conducted by the Office of Nuclear Waste Isolation (ONWI). A deterministic computer model was developed to structure the site selection problem with submodels reflecting the five major outcome categories (Cost, Safety, Delay, Environment, Community Impact) to be evaluated in the decision process. Time-saving modifications were made in the tree code as part of the effort. In addition, format changes allowed retention of information items which are valuable in directing future research and in isolation of key variabilities in the Site Selection Decision Model. The deterministic code was linked to the modified tree code and the entire program was transferred to the ONWI-VAX computer for future use by the ONWI project.

9493 **(UCRL—15516) Support for DOE program in mineral waste-form development.** Palmour, H. III; Hare, T.M.; Russ, J.C.; Batchelor, A.D.; Paisley, M.J.; Freed, L.E. (North Carolina State Univ., Raleigh (USA). Dept. of Materials Engineering). Sep 1982. Contract W-7405-ENG-48. 85p. NTIS, PC A05/MF A01. Order Number DE84004795.

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This research investigation relates to sintered simulation ceramic waste forms of the generic SYNROC compositional type. Though they have been formulated with simulated wastes only, they serve as prototypes for potential hot, processed, crystalline waste forms whose combined thermodynamic stability and physical integrity are considered to render them capable of long-term imobilization of high-level radwastes under deep geologic disposal conditions. The problems involved are nontrivial, largely because of the very complex nature of the radwastes: a typical waste stream would contain more than 31 cation species. When the stabilizing matrix constituents are included, the final batch composition must successfully account (and find substitutional homes for some 35 different cation species. One of the important objectives of this study thus has been to develop a computer-based method for simulating these complex ion substitutions, and for calculating the resultant phase demands and batch formulations. Primary goals of the study have been (1) use of that computer simulation capability to incorporate rationally the radwaste ions from a specific waste stream (PW-7a) into the available SYNROC lattice sites and (2) utilization of existing ceramic processing and sintering methodologies to assure (and to understand) the attainment of high density, fine microstructure, full phase development and other features of the sintered product which are known to relate directly to its integrity and leach resistance. Though improved resistance to leaching has been a continuing goal, time and budget constraints have precluded initiation of any leachability studies of these new compositions during this contract period. 27 references, 15 figures, 6 tables.

9494 **The effects of surface area to solution volume on waste glass leaching.** Pederson, L.R.; Buckwalter, C.Q.; McVay, G.L. (Pacific Northwest Laboratory, P.O. Box 999, Richland, Washington 99352). *Nuclear Technology;* **62**: No. 2, 151-158(Aug 1983). Contract AC06-76RL01830.

Silicon solubility limitations appear to control the rate of corrosion of a complex simulated nuclear waste glass at relatively high values of the glass surface area to solution volume ratio (SA/V). Undersaturated glass components such as sodium and boron were affected by SA/V in a manner similar to silicon. Under relatively low SA/V conditions, glass corrosion was unaffected by changes in the SA/V ratio. Congruent dissolution was never observed, in contrast to previous results for simple and certain complex silicate glasses. Increases in the SA/V value may be a viable method for performing accelerated leach resistance testing of nuclear waste forms.

9495 **Status, direction, and critical issues of waste treatment technology.** Knowles, D.E.; Bonner, W.F. (Pacific Northwest Laboratory, Richland, Washington). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 2254-2259(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Nuclear power production and related activities generate radioactive wastes that must be safely managed to protect workers and the general public. The liquid-fed ceramic melting (LFCM) vitrification process is the reference process for vitrifying high-level nuclear waste in the U.S. as well as in Japan and India. The French are currently using a rotary kiln calciner/metallic melter system at their reprocessing facility. Compaction or controlled-air incineration are the currently preferred options for low-level waste solids, followed by immobilization in an appropriate matrix. The Nuclear Waste Policy Act of 1982 is a significant step in proceeding with waste treatment and disposal. Programs can now build on past work to assure that public safety and regulations are met in a cost-effective manner.

9496 **Radioactive wastes.** Boegly, W.J. (Oak Ridge National Lab., TN); Alexander, H.J. *Journal - Water Pollution Control Federation;* **55**: No. 6, 735-743(Jun 1983).

A literature review on studies concerning radioactive wastes is presented. Literature on radioactive wastes available from the National Technical Information Service, Washington, DC, was not included in the review. Studies were reviewed that dealt with general programs for radioactive wastes; isolation of radioactive wastes; waste management; waste storage; environmental transport; transportation; risk assessment; and remedial action are reviewed.

9497 **Alternative strategy for commercial high-level radioactive waste management.** Northrup, C.J. (Sandia National Labs., Albuquerque, NM (USA)); Jardine, L.J.; Steindler, M.J. (Argonne National Lab., IL (USA)). pp 461-475 of Conditioning of radioactive wastes for storage and disposal. Proceedings of an international symposium organized by the IAEA, the CEC and the OECD NEA and held in Utrecht, the Netherlands, 21-25 June 1982. Vienna, Austria; IAEA (1983). (CONF-820651—; IAEA-SM—261/34).

From International symposium on the conditioning of radioactive wastes for storage and disposal; Utrecht, Netherlands (21 Jun 1982).

A current strategy of geologic disposal of immobilized commercial, high-level, nuclear wastes provides long-term storage (hundreds of thousands of years) for a wide spectrum of wastes from the Purex process which would be immobilized in a borosilicate glass. With these wastes emplaced in a repository, the temperature would rise and a high radiolysis field in the near-field region would exist. The temperature increases and peaks within the geologic formations housing the waste repository during the first several hundred years after burial and then declines towards the initial temperature. During this thermal and radiolysis pulse period, the geologic formation and waste packages could be significantly perturbed unless the effects were controlled by some engineered approach. Many of the proposed solutions introduce new economic penalties and/or have serious impacts on how the volume of waste must be handled in production, transportation and final interment in the repository. It is noted that the majority of the thermal energy (as high as 98% after 30 years) in commercial waste aged between 3 and 150 years is due to only two radioactive isotopes, ^{90}Sr and ^{137}Cs and their decay chains, which constitute <10 wt% of the total elements in high-level waste (HLW). Thus removal of caesium and strontium from all the other HLW components greatly reduces the geologic/waste package perturbations caused by the thermal/radiolysis pulse. This paper discusses an assessment of benefits that could be realized from separating only two elements from HLW and handling them separately from the bulk of the remaining solidified HLW. It is noted that treatment of the caesium and strontium separately may result in economic advantages in the waste management system and substantially improves the reliability of the performance of the waste package.

9498 **Sodium conversion experiments in the Inert Carrier Process demonstration plant.** Keneshea, F.J.; Hobart, S.A.; Kelly, M.T.; Pohl, C.S.; Riley, D. (Quadrex Corporation, Campbell, California). *Nuclear and Chemical Waste Management;* 4: No. 2, 189-199(1983). Contract AC19-81BC10632.

The purpose of the sodium treatment studies reported here was to evaluate the use of the Inert Carrier Process (ICP) for converting sodium metal to a stable disposal form. The ICP demonstration plant consists of a closed loop of silicone oil that is circulated through a reservoir called a disperser. Solid sodium particles were fed to the disperser and kept suspended in the silicone oil carrier by turbulence. The sodium did not react with the silicone oil carrier. The dispersion of sodium in silicone oil was fed to an in-line mixer ("jet" mixer) where it was mixed with a reactant. Water was used as the reactant in most of the tests, generating sodium hydroxide and hydrogen as the initial products. Analysis of the final solid product from the reaction indicated that the sodium hydroxide initial product interacted with the silicone oil. Complete reaction of the sodium in the demonstration plant required at least a 6/1 molar ratio of water to sodium. Good separation of the product solution was difficult because of the small difference in density between the aqueous product phase and the organic carrier phase. Emulsification of the silicone oil-aqueous solution was minimized by applying heat to the separator. Foaming of the silicone oil in the separator occurred, aggravated by the evolution of hydrogen from the sodium conversion reaction. Bench-scale tests were conducted to analyze and resolve several problems encountered in the plant experiments, such as incomplete reaction in the jet mixer, poor separation of the product from the silicone oil, formation of an oil aqueous solution emulsion in the separator, and oil foaming in the separator. Solidification tests were carried out to immobilize the sodium conversion product by mixing it with various binders. The most satisfactory binder was EPON 828, an epoxy resin.

9499 **Determination of ferrous-ferric ratios in SYNROC nuclear waste form.** Stephens, F.B.; Sunderland, W.E. (Measurement Science Division, Lawrence Livermore National Laboratory, Livermore, California). *Nuclear and Chemical Waste Management;* 4: No. 2, 141-145(1983). Contract W-7405-ENG-48.

When a titanate synthetic rock (SYNROC) is prepared for experiments in immobilizing high-level nuclear wastes, a controlled redox calcination step is necessary. The redox control condition can be monitored by measuring the Fe(II)/Fe(III) ratio, an important factor in the spinel mineralogy and composition. Two methods for measuring this ratio are described: controlled-potential coulometry and polarography. The two techniques provide results with excellent agreement. A procedure for the dissolution of samples in the absence of air is also given.

9500 **Decontamination of transuranic contaminated metals by melt refining.** Heshmatpour, B.; Copeland, G.L.; Heestand, R.L. (Metals and Ceramics Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Nuclear and Chemical Waste Management;* 4: No. 2, 129-134(1983). Contract W-7405-ENG-26.

Melt refining of transuranic contaminated metals is a possible decontamination process with the potential advantages of producing metal for reuse and of simplifying chemical analyses. By routinely achieving the 10 nCi/g(about0.1ppm) level by melt refining, scrap metal can be removed from the transuranic waste category. (To demonstrate the effectiveness of this melt refining process, mild steel, stainless steel, nickel, and copper were contaminated with 500 ppm (μg/g) PuO_2 and melted with various fluxes. The solidified slags and metals were analyzed for their plutonium contents, and corresponding partition ratios for plutonium were calculated. Some metals were double refined in order to study the effect of secondary slag treatment. The initial weight of the slags was also varied to investigate the effect of slag weight on the degree of plutonium removal. In general, all four metals could be decontaminated below 1 ppm (μg/g) Pu (about100 nCi/g) by a single slag treatment. Doubling the slag weight did not improve decontamination significantly; however, double slag treatment using 5 wt.% slag did decontaminate the metals to below 0.1 ppm (μg/g) Pu (10 nCi/g).)

9501 **Results from long-term use of the MCC-1 static leach test method.** Strachan, D.M. (Pacific Northwest Laboratory, Richland, Washington). *Nuclear and Chemical Waste Management;* 4: No. 2, 177-188(1983). Contract AC06-76RL01830.

At the Materials Characterization Center (MCC), standard tests are being developed to provide reference data for characterizing nuclear waste forms, canisters, and backfills. As part of this development program, a 1-yr test was conducted to determine the usefulness of the MCC-1 Static Leach Test Method and the quality of the data that are generated. The data generated during the tests on PNL 76-68 glass showed that the leaching of this glass at 90°C slowed significantly with time in deionized water and silicate water leachants but continued at a significant rate in brine. The alteration phases were tentatively identified as sauconite, ferrihydrite, talc, and sepiolite. Tests also were performed at 40 and 70°C. These results provided an estimation of 74 $kJ.mol^{-1}.K^{-1}$ for the activation energy. In general, the results from this study indicated the importance of long-term testing in excess of 1 yr.

9502 **Status of high-level waste solidification at West Valley.** Knabenschuh, J.L.; Pope, J.M. (West Valley Nuclear Services Co., Inc., (A Subsidiary of Westinghouse Electric Corporation), West Valley, New York). *Proceedings of the American Power Conference;* 44: 861-863(May 1982). (CONF-820465—).

From 44. annual meeting of the American Power Conference; Chicago, IL, USA (26 Apr 1982).

The West Valley Demonstration Project is a reality. The WVNS staff is essentially up to the full strength anticipated for FY 82. The West Valley Nuclear Services, Co., in intimate cooperation with the Department of Energy, is actively and intensely engaged in the frontend engineering, as well as the planning, scheduling and budgeting for the West Valley Demonstration Project to achieve a cost-effective and early demonstration of commercial high-level waste immobilization to assist in demonstrating in this country that the back end of the nuclear fuel cycle can be safely and successfully closed.

9503 **Management of radioactive waste from uranium mining and milling.** Coffman, F.E. (Department of Energy, Washington, DC (USA)). pp 3-6 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; International Atomic Energy Agency (1982). (CONF-820552—).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

9504 **Management of uranium mill tailings in the United States of America.** Groelsema, D.H. (Department of Energy, Washington, DC (USA)). pp 9-20 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; International Atomic Energy Agency (1982). (IAEA-SM—262/60).

This paper provides an overview of the status and plans for uranium mill tailings management in the United States of America. The discussion includes organizational structures and responsibilities, progress in the development and adoption of standards and regulations, the status of tailings management activities at the active and inactive processing sites and plans for the future.

9505 **Tailings technology. Decommissioning and rehabilitation remedial action technology development.** Ramsey, R.W. Jr. (Department of Energy, Washington, DC (USA)). pp 367-371 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; International Atomic Energy Agency (1982). (CONF-820552—; IAEA-SM—262/65).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

This paper is to provide an overview of technology requirements for long-term uranium mill tailings disposal and remedial actions for existing tailings to ensure their adequate disposal. The paper examines the scientific disciplines that are the basis for the technology of uranium mill tailings stabilization and the design of barriers to control radiological exposure or environmental degradation at the location of tailings disposal. The discussion is presented as a hypothetical course of instruction at a fictitious university. Features of six mechanisms of dispersal or intrusion are examined with brief discussion of the applicable technology development for each. The paper serves as an introduction to subsequent specific technology development papers in the session.

9506 **Technology development effort of the uranium mill tailings remedial actions project.** Matthews, M.L. (Department of Energy, Uranium Mill Tailings Project Office, Albuquerque, NM (USA)). pp 403-415 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; International Atomic Energy Agency (1982). (CONF-820552—; IAEA-SM—262/42).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

A multi-facet technology development programme was initiated by the Uranium Mill Tailings Remedial Actions (UMTRA) Project Office of the United States Department of Energy (DOE) in order to develop better techniques, designs and systems for the stabilization of uranium mill tailings piles. In 1978 the United States Congress passed a law which authorized the DOE to perform remedial actions at 24 inactive uranium mill tailings piles. It was determined that a major research and development programme needed to be initiated in order to achieve a high degree of assurance that compliance with strict remedial action standards could be met. The purpose of the technology development programme is to aggressively expand the state of the art in the area of stabilization systems. Therefore, an applied research effort was undertaken to determine the characteristics, phenomena, and dynamics of the inactive tailings piles. In addition, a development effort commenced that consisted of testing advanced cover and liner systems as well as evaluating schemes to recondition the tailings.

9507 **Uranium mill tailings remedial action project (UMITRAP) - Cover and liner technology development project.** Hartley, J.N.; Gee, G.W.; Freeman, H.D.; Cline, J.F.; Beedlow, P.A.; Buelt, J.L.; Relyea, J.R. (Battelle Pacific Northwest Labs., Richland, WA (USA)); Tamura, T. (Oak Ridge National Lab., TN (USA)). pp 429-448 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; International Atomic Energy Agency (1982). (CONF-820552—; IAEA-SM—262/39).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

Cover and liner systems for uranium mill tailings in the United States of America must satisfy stringent requirements regarding long-term stability, radon control, and radionuclide and hazardous chemical migration. The cover placed over a tailings pile serves three basic purposes: (1) to reduce the release of radon, (2) to prevent the intrusion of plant roots and burrowing animals into the tailings, and (3) to limit surface erosion. The liner placed under a tailings pile prevents the migration of radionuclides and hazardous chemicals to groundwater. Battelle Pacific Northwest Laboratories is developing and evaluating cover and liner systems that meet these objectives and conform to federal standards. The cover and liner technology discussed in this paper involves: (1) single and multilayer earthen cover systems, (2) asphalt emulsion radon barrier systems, (3) biobarrier systems, (4) revegetation and rock covers, and (5) asphalt, clay, and synthetic liner systems. These systems have been tested at the Grand Junction, Colorado, tailings pile, where they have been shown to effectively reduce radon releases and radionuclide and chemical migration.

9508 **Focus for the NWTS program.** Shipler, D.B. (Office of Nuclear Waste Isolation, Battelle Project Management Division, 505 King Avenue, Columbus, Ohio). *American Society of Mechanical Engineers, [Paper];* **82-NE-8**: 7(1982). (CONF-820705—).

From 2. joint ASME/ANS nuclear engineering conference; Portland, OR, USA (25 Jul 1982).

The Reagan Administration has made a commitment to encourage the use of nuclear power; the Secretary of the Department of Energy has further emphasized the importance of moving as quickly and prudently as possibl to identify sites for permanent disposal of radioactive wastes; and, nuclear waste management has the support and personal attention of policy makers at the highest level--both within the Executive and Legislative Branches. This focus is causing changes in the National Waste Terminal Storage Program related to identification of suitable sites, initiation of exploratory shafts, development of a Test and Evaluation Facility, and application for a repository construction authorization.

9509 **Selected transuranic waste immobilization systems.** Timmerman, C.L.; Ross, W.A.; Treat, R.L. (Pacific Northwest Laboratory, Richland, WA). *American Society of Mechanical Engineers, [Paper];* **82-NE-10**: 8(1982). (CONF-820705—). Contract AC06-76RL01830.

From 2. joint ASME/ANS nuclear engineering conference; Portland, OR, USA (25 Jul 1982).

Waste contaminated with transuranic (TRU) elements may require immobilization prior to final disposal. Pacific Northwest Laboratory has conducted research and development to identify and characterize the wastes; to evaluate the possible immobilization requirements and treatment alternatives; and to develop immobilization process technologies. This paper describes systems that are anticipated to be capable of immobilizing a selected TRU waste stream consisting of a blend of process sludge and incinerator ash. The selected waste streams are based on the waste compositions generated at the Rocky Flats Plant, Golden, Colorado. The specific waste forms and processes considered are identified in Table 1. Summary results of leach testing of the immobilized waste forms is provided for comparison. This information along with the processing considerations identify the major advantages and disadvantages of each system. The evaluation of these considerations suggests the implementation for cement or glass system with preference to the cast cement system because of its process simplicity.

9510 **Prediction of centrifugal pump cleaning ability in waste sludge.** Churnetski, B.V. (E.I. duPont de Nemours and Co., Savannah River Laboratory, Aiken, SC). *Nuclear and Chemical Waste Management;* **3**: No. 4, 199-204(1982). Contract AC09-76SR00001.

(Radioactive waste at the Savannah River Plant (SRP) is being transferred from older waste tanks to new, stress-relieved tanks for more effective waste management. The technology developed for waste removal involves the use of long-shaft, recirculating, centrifugal pumps (slurry pumps). Testing completed at the Savannah River Laboratory's 30-meter-diameter mock-up waste tank related the effective cleaning radius (ECR) of a slurry pump to critical pump and material characteristics. Presently, this theory is being applied to radioactive waste at SRP.) However, the technology can be applied to other remote handling situations where the slurry rheology can be determined.

9511 **Incorporation of radionuclides in crystalline titanates.** Vance, E.R.; Agrawal, D.K. (Materials Research Laboratory, Pennsylvania State University, University Park, Pennsylvania). *Nuclear and Chemical Waste Management;* **3**: No. 4, 229-234(1982). Contract AC09-79ET41900.

The solid solubilities of some or all of Cs, Sr, Y, La, U, Th, and Na in each of barium hollandite, zirconolite and titanite were investigated by X-ray diffraction in samples prepared by ceramic techniques at 1100-1400°C. Various charge compensation schemes were used in attempts to incorporate aliovalent ions. Cs and Sr, but not the other ions, have extensive solid solubilities in barium hollan-

dite. Zirconolite dissolves relatively large amounts of Na, as well as actinides and the smaller rare earths. Appreciable amounts of Sr, Na, rare earths, and actinides can be accommodated in titanite. Titanite is compatible with zirconolite but not with barium hollandite at about 1200°C.

9512 **Some deficiencies in analyzing leachates and reporting results.** Sill, C.W. (E G & G Idaho, Inc., Idaho Falls, ID). *Nuclear and Chemical Waste Management;* 3: No. 3, 141-148(1982). Contract AC07-76ID01570.

Determination of the leachability of elements from various waste forms for long-term retention of radioactive wastes requires chemical analysis of both the leachate and waste form for the various elements or radionuclides of interest. Neither the precision of the leaching procedure nor the accuracy of the results can be determined unambiguously if gross uncertainties exist in either the analytical methods used or the way in which the results are reported and/or interpreted. Perhaps the most important consideration is to demonstrate beforehand that all participating laboratories can obtain the same analytical result within some stated uncertainty when the same concentration is known to be present, i.e., by analysis of a single homogeneous solution. Special precautions must be taken to ensure that all material leached from the waste form is recovered from the leaching container and that all refractory particles are dissolved completely before analysis is begun. Problems involved in interlaboratory comparisons are also discussed.

9513 **Temporal stability of chelated Co and Zn in reducing geochemical environments.** Czyscinski, K.S.; Kinsley, M.T. (Brookhaven National Laboratory, Upton, NY). *Nuclear and Chemical Waste Management;* 3: No. 3, 191-195(1982). Contract AC02-76CH00016.

Laboratory controlled-environment experiments were performed to measure the temporal stability of CoEDTA, CoNTA, CoDTPA, and ZnEDTA complexes in strongly reducing anoxic geochemical regimes. Cobalt complexes are persistent in these environments relative to ZnEDTA which is removed rapidly from solution. The results apparently reflect kinetic differences in reactivity between Co and Zn in contrast to expected behavior based on reported stability constants for Co and Zn chelates. These results indicate that reliable predictions of metal-chelate behavior under field conditions cannot be based on similarities in thermodynamic equilibria constants alone without empirical confirmation.

0530 Environmental Aspects

REFER ALSO TO CITATION(S) 9455, 9464, 9473, 9484, 9494, 9496, 9518, 9520, 10681

9514 **(DPST—83-209) Groundwater monitoring in the Savannah River Plant low-level waste burial ground: a summary and interpretation of the analytical data.** Ryan, J.P. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 20 Feb 1983. Contract AC09-76SR00001. 122p. D. Order Number DE84005273.

Microfiche only, copy does not permit paper copy reproduction.

This document describes chemical mechanisms that may affect trace-level radionuclide migration through acidic sandy clay soils in a humid environment, and summarizes the extensive chemical and radiochemical analyses of the groundwater directly below the SRP Low-Level Waste (LLW) Burial Ground (643-G). Anomalies were identified in the chemistry of individual wells which appear to be related to small amounts of fission product activity that have reached the water table. The chemical properties which were statistically related to trace-level transport of Cs-137 and Sr-90 were iron, potassium, sodium and calcium. Concentrations on the order of 100 ppM appear sufficient to affect nuclide migration. Several complexation mechanisms for plutonium migration were investigated, but most of these were shown to be incapable of mobilizing more than trace quantities of plutonium. The parameters of greatest importance were oxidation-reduction potential, pH, dissolved organic carbon, phosphate and carbonate. Of these, organic and phosphate complexation had the greatest potential for mobilizing plutonium in the SRP groundwater. In the absence of such complexants, plutonium would be essentially immobile in the soil/water system of the SRP burial ground. 50 references, 8 figures, 2 tables.

9515 **(NVO—265) Engineering Test Plan for field radionuclide migration experiments in Climax granite: peer review documentation.** (USDOE Nevada Operations Office, Las Vegas). Nov 1983. 34p. NTIS, PC A03/MF A01. Order Number DE84005312.

This document is a compilation of review comments on the Engineering Test Plan (ETP) for field radionuclide migration experiments in the Climax granite. This investigation was managed by the Nevada Nuclear Waste Storage Investigations (NNWSI) and the principal NNWSI participant organization conducting the investigation was Lawrence Livermore National Laboratory (LLNL). An NWTS decision to cease funding for the ETP, along with an NNWSI decision that sufficient knowledge had been gained to support their tuff evaluation, has resulted in the termination of the Plan as emphasis was shifted away from this study in the Climax granite. The purpose of this granite radionuclide migration peer review was to complete the assessment of the ETP so that the Plan could be finalized and the technical community could take advantage of the extensive generic National Waste Terminal Storage (NWTS) research conducted by the NNWSI for the Office of Nuclear Waste Isolation (ONWI). The objectives of this investigation were: to develop equipment and procedures for a reliable field migration test that can be used at candidate repository sites in fractured rock; determine field retardation factors for selected radionuclides that can be compared to laboratory measured values; and provide input to mass transport models that will improve the ability to make dependable pretest predictions and aid in data interpretations.

9516 **Finding and evaluating potential radiological problems in the vicinity of uranium milling sites.** Goldsmith, W.A. (Oak Ridge National Lab., TN (USA)); Yates, W.G. (Monsanto Research Corp., Miamisburg, OH (USA). Mound Facility). pp 573-586 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; IAEA (1982). (CONF-820552—; STI/PUB—622; IAEA-SM—262/67).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

The Oak Ridge National Laboratory (ORNL) has been performing radiological surveys at former uranium and thorium milling and processing sites since 1975. Tailings at inactive milling sites usually have a low frequency of human occupancy but continuously generate ^{223}Rn into the atmosphere. Thus, independent ^{222}Rn surveys are conducted at the inactive mill sites and their environs by the Mound Facility. Measurements of airborne ^{222}Rn and ^{223}Rn flux are made on the sites to define the tailings source term. Concurrently with these measurements, an ambient ^{222}Rn monitoring network is established off-site and a meteorological station is established at or near the mill site. Unfortunately, tailings are not always confined to the milling site. Radioactivity can migrate to areas outside of site boundaries by wind and water erosion, groundwater transport, spillage of incoming ore, and removal of tailings or other material for private purposes. In order to identify and assess off-site radioactivity on properties in the vicinity of milling sites, a combination of aerial and ground-level radiological monitoring techniques are used. The ground mobile gamma-ray scan is conducted using a vehicle equipped with sensitive gamma-ray detectors. The detectors are shielded so that gamma radiation input is viewed through only one side of the vehicle. This system is capable of precisely locating properties which have anomalously high gamma radiation levels caused by the presence of tailings. Subsequently, these properties are identified as candidate vicinity properties and are scheduled for radiological surveys subject to the property owner's consent. The comprehensive radiological surveys conducted at these vicinity properties determine the amount, type, and location of tailings materials.

0540 Health And Safety

REFER ALSO TO CITATION(S) 9452, 9487, 10472, 10695, 10847, 10896

9517 (CONF-821215—, pp 367-385) **ALARA beyond dollars per person-rem.** Waite, D.; Harper, W. (Office of Nuclear Waste Isolation, Columbus, OH). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The trend in radiological assessments over the past decade is to extract more and more information from each bit of data. In the 1960's it was sufficient to calculate doses to the maximum individual and populations from exposure to critical nuclides in critical pathways. The 1970's brought the UNSCEAR and BEIR Reports and made the extension of calculated doses to predicted health effects fashionable. The 1980's may see data analysis extended still further to the use of an index of lost productivity. Advantages of these types of uses of dose calculations include the derivation of further insight into the system being analyzed and the attainment of a greater measure of comparability with impacts from agents other than radiological. The question is, where does the uncertainty in the analytical result overwhelm any possibility of its usefulness. This presentation addresses this question in the context of a performance analysis of a high-level nuclear waste repository. Estimates of uncertainty in dose calculations, health effects predictions and loss of productivity predictions are derived from examination of the open literature and the use of propagation of uncertainty techniques. The expected values and uncertainties are compounded as they would be in an ALARA analysis and the outcomes are analyzed. The advantages and disadvantages of truncating the analysis at each stage of extension are discussed. 21 references, 3 tables.

9518 **(NRPB-R—138) Radiological protection aspects of shallow land burial of PWR operating wastes.** Pinner, A.V.; Hill, M.D. (National Radiological Protection Board, Harwell (UK)). Dec 1982. 83p. HMSO, London, price Pound4.00.

A preliminary assessment of the radiological impact of disposal of PWR operating wastes in an engineered burial facility at shallow depth is given. The two main mechanisms by which radionuclides may be released from a shallow land burial facility are considered. These are contact of the wastes by water and human intrusion after the site has been closed and restrictions on use of the land have been removed. Contact by water is assumed to be certain to occur; human intrusion is treated as an event with a probability of occurrence. Mathematical models predict the maximum individual doses which would be received through these two release mechanisms. The probability of intrusion into the site is estimated from information on current land use patterns in the UK. Since the assessment is preliminary and generic, the results cannot be used in decisions on the acceptability of any specific burial site or facility. However, they do show that shallow burial of PWR operating wastes in an engineered facility in clay strata could be acceptable from a radiological protection point of view, and that this disposal option is thus worthy of further investigation.

9519 **(NUREG/CR—3343) Recommended radiation protection practices for low-level waste disposal sites.** Hadlock, D.E.; Hooker, C.D.; Herrington, W.N.; Gilchrist, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Dec 1983. Contract AC06-76RL01830. 128p. (PNL—4561). NTIS, PC A07/MF A01 - GPO $5.50. Order Number DE84005656.

Portions are illegible in microfiche products.

The United States Nuclear Regulatory Commission contracted with Pacific Northwest Laboratory (PNL) to provide technical assistance in establishing operational guidelines, with respect to radiation control programs and methods of minimizing occupational radiation exposure, at Low-Level Waste (LLW) disposal sites. The PNL, through site visits, evaluated operations at LLW disposal sites to determine the adequacy of current practices in maintaining occupational exposures as low as is reasonably achievable (ALARA). The data sought included the specifics of: ALARA programs, training programs, external exposure control, internal exposure control, respiratory protection, surveillance, radioactive waste management, facilities and equipment, and external dose analysis. The results of the study indicated the following: The Radiation Protection and ALARA programs at the three commercial LLW disposal sites were observed to be adequate in scope and content compared to similar programs at other types of nuclear facilities. However, it should be noted that there were many areas that could be improved upon to help ensure the health and safety of the occupationally exposed individuals. As a result, radiation protection practices were recommended with related rationales in order to reduce occupational exposures as far below specified radiation limits as is reasonably achievable. In addition, recommendations were developed for achieving occupational exposure ALARA under the Regulatory Requirements issued in 10 CFR Part 61. 66 references, 26 figures, 7 tables.

0550 Regulations

REFER ALSO TO CITATION(S) 9532

9520 (CONF-821215—, pp 189-194) **Rocky Flats Plant interaction with the Colorado Department of Health.** Hornbacher, D.D. (Rockwell International, Golden, CO). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The Rocky Flats Plant maintains a continuous interface with the Colorado Department of Health. The basis for this interface is contained in the memorandum of understanding. Monthly, a public meeting is held to share information. Typical topics discussed are Rocky Flats monitoring data, Colorado Department of Health environmental surveillance data, and water surveillance data from Broomfield, a city located downstream from the plant. Agenda items also include changes in plant operations and materials, and the plant monitoring program. Special topics of common interest such as new construction activities and health effect studies are periodically presented. The meeting is commonly attended by city, county, state and federal officials as well as the public. At times, the news media also attends. This interface with the State of Colorado and others provides a means to demonstrate cooperative actions and generally is beneficial to the plant. However, the potential for negative benefits is always present. This presentation summarizes the plant experiences gained through public meetings with the State of Colorado.

9521 **(LA—9821-PR) Safeguards and security. Progress report, August 1982-January 1983.** Smith, D.B. (comp.). (Los Alamos National Lab., NM (USA)). Nov 1983. Contract W-7405-ENG-36. 80p. NTIS, PC A05/MF A01. Order Number DE84004475.

Activities are described in the first four parts of this report: Nuclear Facility Support, Security Development and Support, Safeguards Technology Development, and International Safeguards. Part 1 covers efforts of direct assistance to the Department of Energy (DOE) and Nuclear Regulatory Commission (NRC) licensee facilities. This assistance includes consultation on materials accounting problems, development of specialized techniques and instruments, and comprehensive participation in the design and implementation of advanced safeguards systems. In addition, a series of training courses in various aspects of safeguards makes the technology more accessible to those who must apply it. Part 2 treats a relatively new set of Los Alamos activities aimed at the security of information and computer systems. Our focus this period was on continuing the activities of the Computer Security Center, which provides the basis for encouraging and disseminating this emerging technology, and on the development and demonstration of secure computer systems. Part 3 describes the broad development efforts essential to continuing improvements in the practice of safeguards. Although these projects are properly classified as developmental, in every case they address recognized problems that commonly occur in operating facilities. Finally, Part 4 covers international safeguards activities, including both support to the International Atomic Energy Agency and bilateral exchanges. Enrichment plant safeguards, especially those concerning the Gas Centrifuge Enrichment Plant, required a significant portion of our resources. These efforts are beginning to provide substantial returns on our investment in technology transfer, not only in raising the level of safe-

guards effectiveness but also in benefiting from field experiences in operating environments.

9522 **(NUREG/CR—3128) SIMALIR: simulation of materials licensing review.** Sasser, D.W. (Sandia National Labs., Albuquerque, NM (USA)). Dec 1983. Contract AC04-76DP00789. 63p. (SAND—82-0679). NTIS, PC A04/MF A01 - GPO $4.50. Order Number DE84004662.

The Material Licensing Branch (MLB) of the Division of Fuel Cycle and Material Safety, Office of Nuclear Material Safety and Safeguards, US Nuclear Regulatory Commission (NRC) has the responsibility for issuing licenses for the use of reactor byproduct materials, source materials, and special nuclear materials in applications other than nuclear reactors. In September 1980, Sandia National Laboratories, Albuquerque (SNLA) was authorized by the NRC to undertake a study entitled An Analysis of the Materials License Application Review Process. The purpose of this study was to identify measures that will improve the efficiency and technical adequacy of the materials license application review process. In support of this study, a computer simulation model, SIMALIR (SImulation of MAterials LIcensing Review), that simulates the materials licensing review process of the NRC has been developed. The model, which is based upon the Simulation Language for Alternative Modeling (SLAM), is used to examine possible improvements to the review process to determine ways to improve efficiency and technical adequacy. Results of a base case simulation and parameter sensitivity studies are presented.

9523 **(NUREG/CR—3347-Vol.2) Materials licensing study, Phase 1. Volume 2. Findings and recommendations.** Elliot, J.M.; Arcuni, A.A.; Immerman, W.H.; Welles, B.W.; Varnado, G.B. (International Energy Associates Ltd., Washington, DC (USA); Sandia National Labs., Albuquerque, NM (USA)). Nov 1983. Contract AC04-76DP00789. 23p. (SAND—83-7081-Vol.2). NTIS, PC A02/MF A01 - GPO $3.25. Order Number DE84004665.

This is one of a series of seven reports which describe a study of nuclear material licensing conducted for the Office of Nuclear Regulatory Material Safety and Safeguards, US Nuclear Regulatory Commission (NRC). The purposes of this project are to analyze the process used by NRC to license nuclear materials, and based upon this analysis to recommend measures to improve the efficiency of such license application review. This report presents summary findings and recommendations relevant to the data collection effort documented in SAND83-7081/1 of 3. Recommendations are based upon findings derived from review of deficiency letters, dockets, application guides, the license application review process, and the license renewal process. Several of the eleven (11) recommendations address the need for an improved regulatory base which would integrate and streamline all the diverse regulatory documents and procedures. In addition, the report proposes implementation of a computer based nuclear materials licensing support system to aid in all phases of materials license review.

9524 **(NUREG/CR—3522-Vol.2) Reference materials for nondestructive assay of special nuclear material. Volume 2. Thin metal foils of highly enriched uranium.** Sprinkle, J.K.; Likes, R.N.; Smith, H.A. (Los Alamos National Lab., NM (USA)). Oct 1983. Contract W-7405-ENG-36. 24p. (LA—9910-MS-Vol.2). NTIS, PC A02/MF A01 - GPO. Order Number DE84005124.

This report describes the fabrication of reference materials for use in gamma-ray-based nondestructive assay of small high-density uranium samples. The sample containers are small Petri dishes. The reference materials consist of thin circular discs of highly enriched uranium metal foil. The ^{235}U content ranges from 0.2 to 10 g. The report also describes the assay procedure used with low-resolution detectors.

06 FUSION FUELS

REFER ALSO TO CITATION(S) 10003

0601 Sources

9525 **Hydrogen diffusion and isotope separation.** Lee, M.L. (Univ. of Georgia, Athens). pp 553-554 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—). Contract AS09-77ER01023.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

0609 Environmental Aspects

9526 **(IAEA-TECDOC—277, pp 111-148) Some environmental aspects of fusion reactor waste: Potential environmental concentrations of relevant radionuclides in drinking water.** Gruber, J. (Hahn-Meitner-Institut fuer Kernforschung Berlin G.m.b.H. (Germany, F.R.)). Mar 1983. NTIS (US Sales Only), PC A09/MF A01. (CONF-810352—).

From International Atomic Energy Agency conference on fusion safety; Vienna, Austria (23 Mar 1981).

If traces of 1 ppm of any element are irradiated in a flux of 14 MeV neutrons corresponding to 1 MW/m^2 ($4.5x10^{13} cm^{-2}s^{-1}$) or by an equal flux of thermal neutrons, an important contribution to the long lived ($T>10^2a$) overall biological hazard potential of all impurities stems from the activated metals of the following three groups: (a) Mn, Fe, Ni, Pb, Bi; (b) Be, Al, Zr; (c) Mo, Tc. An evaluation of the potential hazards originating from those radionuclides for man should not only consider the activities and their radiotoxicities alone, as does the biological hazard potential, but should also include properties that describe the mobility of the radionuclides in the environment. Here it is proposed to use the solubilities of compounds of the radionuclides in pure water as a first approximation. For relevant environmental Esub(H)/pH domains (Esub(H) = electrochemical potential) group (a) metals are potentially soluble releasing positively charged ions (cations) in aqueous solution. Group (b) metals have a low solubility, but form again cations. Group (c) metals are readily soluble forming negatively charged complexes $(H)MeO_4^-$. Using the specific activity generated in the neutron fields mentioned above, one can convert the solubility into a potential contamination level. Based on the recommendations of the International Commission on Radiological Protection (reference) levels of contamination are defined, which may be accepted for drinking water. The potential levels for Mn, Be and Zr lie below the reference levels, whereas Ni, Mo, Bi, Al and Pb lead potentially to an excessive equilibrium contamination of Measurements of the concentrations of metal cations in equilibrium soil solutions have yielded values that are lower by many orders of magnitude than the ones in pure water.

07 ISOTOPE AND RADIATION SOURCE TECHNOLOGY

0701 Physical Isotope Separation

9527 **(MLM—3125) Mound activities in chemical and physical research: January-June 1983.** (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 16 Dec 1983. Contract AC04-76DP00053. 56p. NTIS, PC A04/MF A01. Order Number DE84004303.

Progress and activities are reported on: low-temperature trennschaukel (thermistor calibration, thermal conductivity of He-Ne), liquid-phase thermal diffusion (properties of ethyl chloride), zinc isotope separation, mutal diffusion, molecular beam scattering, calcium isotope separation by ion exchange, thermal stability of crystalline and amorphous ZrPdH/sub x/, and measurement of environmental HT and HTO in the air near Mound. (DLC)

0702 Radiation Sources

REFER ALSO TO CITATION(S) 10538, 10540, 10822, 11152, 11257

9528 **(BNL—34069) Generation of intense coherent soft x-ray with electron microbunches induced and frozen by lasers.** Yu. L.H. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Stony Brook (USA). Dept. of Physics). 1983. Contract AC02-76CH00016. 18p. (CONF-8309118—7). NTIS, PC A02/MF A01. Order Number DE84005361.

From Topical meeting on free electron generation of extreme ultraviolet coherent radiation; Upton, NY, USA (19 Sep 1983).

We describe a new improved version of Transverse Optical Klystron Harmonic Generator that uses three lasers to replace the undulators in the modulator and radiator and freeze the electron microbunching. We show that intense soft x-rays can be generated.

9529 (INIS-mf—8642, pp 49) **International cooperation of Institute for Research, Production and Application of Radioisotopes in radionuclide metrology.** Kokta, L.; Dryak, P. (Ustav pro Vyzkum, Vyrobu a Vyuziti Radioisotopu, Prague (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

9530 **(UCRL—89212-Rev.1) Intense positron beams: linacs. Preworkshop copy.** Howell, R.H.; Alvarez, R.A.; Woodle, K.A.; Dhawan, S.; Egan, P.O.; Hughes, V.W.; Ritter, M.W. (Lawrence Livermore National Lab., CA (USA); Yale Univ., New Haven, CT (USA). Gibbs Lab.). Sep 1983. Contract W-7405-ENG-48. 11p. (CONF-830770—1-Rev.1). NTIS, PC A02/MF A01. Order Number DE84004760.

From NATO advanced research workshop on positron scattering in gases; London, UK (19 Jul 1983).

Beams of monoenergetic positrons with energies of a few eV to many keV have been used in experiments in atomic physics, solid state physics and materials science. The production of positron beams from a new source, an electron linac, is described. Intense, pulsed beams of low-energy positrons have been produced by a high-energy beam from an electron linac. The production efficiency, moderator geometry, beam spot size and other positron beam parameters have been determined for electrons with energies from 60 to 120 MeV. Low-energy positron beams produced with a high-energy electron linac can be of much higher intensity than those beams currently derived from radioactive sources. These higher intensity beams will make possible positron experiments previously infeasible.

9531 **Pulsed neutron beams from steady state reactors.** Chrien, R.E. (Brookhaven National Lab., Upton, NY (USA)). pp 197-216 of Neutron sources for basic physics and applications. Cierjacks, S. (ed.). Oxford, England; Pergamon (1983).

The method of obtaining pulsed neutron beams from steady state reactors using a "chopper" is described. Principles of chopper design, design and operation considerations, correlation methods in time-of-flight spectroscopy are discussed. The principles of operation of phased choppers, filter-chopper combinations, and non-mechanical choppers are outlined.

9532 **Application of a 14 MeV neutron source to the detection of special nuclear material diversion.** Smith, G.W.; Rice, L.G. III. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1637-1639(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Some special nuclear material (SNM) is seriously vulnerable to diversion if currently used safeguards methods are applied to an unattended material/equipment pass-through. Without visual inspection, radiation shielding can be used to defeat direct detection of characteristic ^{235}U radiation. Plutonium-239 is much less vulnerable to concealment by radiation shielding due to the prompt radiation from ^{240}Pu which accompanies ^{239}Pu in small amounts. An active neutron technique can be used to combine direct SNM detection and neutron shield detection to limit the amount of shielding to conceal SNM. While this technique is not presently adequate to meet the desired SNM detection threshold of 20g, an additional detection option of neutron capture gamma-ray spectroscopy is being studied.

0703 Isotopic Power Supplies

9533 **(DPSPU—82-30-11) Detection and sizing of underbead cracks using ultrasonic nondestructive examination.** Scarbrough, J.D.; Wierzbicki, W.M. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)). [nd]. Contract AC09-76SR00001. 15p. NTIS, PC A02/MF A01. Order Number DE83012205.

Ultrasonic nondestructive examination (NDE) will detect three mil deep underbead cracks in welds joining thin walled iridium hemishells. A correlation was developed to relate the amplitude of the signal reflected from the crack with crack wall area. The observed cracks occur in the weld underbead in the arc taper area during encapsulation of $^{238}PuO_2$ pellets for thermoelectric generators used in deep space exploration.

08 HYDROGEN

0801 Production

REFER ALSO TO CITATION(S) 9619

0802 Storage

REFER ALSO TO CITATION(S) 9525, 10354

0803 Transport

9534 **Systems analysis of hydrogen supplementation in natural gas pipelines.** Hermelee, A.; Beller, M.; D'Acierno, J. (Brookhaven National Lab., Upton, NY). pp 555-557 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—). Contract AC02-76CH00016.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

0804 Marketing And Economics

REFER ALSO TO CITATION(S) 9534

0806 Industrial And Commercial Use

REFER ALSO TO CITATION(S) 10178

0808 Properties

REFER ALSO TO CITATION(S) 9405

09 OTHER SYNTHETIC AND NATURAL FUELS

REFER ALSO TO CITATION(S) 10240

0901 Hydrocarbon Fuels

REFER ALSO TO CITATION(S) 9249, 9250, 9252, 9253, 9559, 9591, 9592, 10167, 10379

9535 (CONF-831205—5) Integrated palm oil processing. Compere, A.L.; Griffith, W.L.; Googin, J.M. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 9p. NTIS, PC A02/MF A01. Order Number DE84004580.

From 6. Miami international conference on alternative energy sources; Miami Beach, FL, USA (12 Dec 1983).

Tree palms are a promising source of fuel extenders and substitutes. They are perennials which bear oil for a period of two to three decades after a roughly four year preliminary growth period. Tree palms are now one of the most efficient energy crops: the best modern varieties can provide up to 6 tonnes per hectare per year of mesocarp and kernal oils. Palms are particularly attractive in areas where more conventional farming would pose a significant threat of laterization of cause major ecological problems. Technology for palm oil production is can range between village level manual operations and highly industrialized mills. Process energy is often supplied by combustion of byproducts. Although palm oil is a good energy crop, its physical and combustion properties preclude most use in conventional diesel engines, although palm oil could be directly blended with residual fuel oils for use in some large engines. At present, two uses for palm oil as a diesel fuel extender or substitute appear attractive: microemulsion blends using palm soapstock and monoesters produced by exchanging small alcohols for the glycerol in triglycerides. The amount of alcohols required for conversion of a substantial fraction of palm oil or palm oil soapstock to fuel extenders or substitutes is proportionately small, and, to a major extent, can be supplied by palm processing waste materials. Fermentation and gasification produced alcohols in the one to four carbon range are suitable for use in formulating palm oil based fuels. On a stoichiometric basis, it appears that the value of the palm oil and alcohols are very close to their value as export items. Use of these palm oil fuels could help to decrease balance of payments problems for developing countries, as well as provide a secure market for agricultural products and improved rural employment.

9536 (DOE/PC/50816—5) Metal boride catalysts for indirect liquefaction. Quarterly technical progress report, September 1-November 30, 1983. Bartholomew, C.H. (Brigham Young Univ., Provo, UT (USA)). 30 Dec 1983. Contract FG22-82PC50816. 43p. NTIS, PC A03/MF A01. Order Number DE84004207.

During the fifth quarter six boron-promoted cobalt and iron catalysts were prepared by new procedures developed in this laboratory. The cobalt preparations produced high surface area cobalt borides; the iron preparations were unsuccessful. The cobalt boride catalysts were characterized by chemical analysis, BET, and H_2 chemisorption. Two unsupported catalysts reduced at 250 and 350°C respectively were tested for CO hydrogenation activity and selectivity at 1 atm. The results confirm that boron-promoted cobalt is particularly selective for C_6-C_{12} hydrocarbons and for C_3-C_7 olefins. Methane and C_2-C_4 makes increase while C_5-C_{13} make decreases with increasing reduction temperature. Our liquid nitrogen Moessbauer cell was redesigned and refitted for high vacuum operation. It will be used to test iron borides at liquid nitrogen temperatures since most of the room temperature data were not definitive.

9537 (DOE/PC/60795—1) Characterization of supported iron catalysts during Fischer-Tropsch synthesis. Technical progress report, August 1, 1983-December 31, 1983. (Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry). 1983. Contract FG22-83PC60795. 2p. NTIS, PC A02/MF A01. Order Number DE84005407.

A primary objective of this work is to characterize the stable, catalytically active surface formed on supported iron catalysts during Fischer-Tropsch synthesis. The characterization will be based on a comparison of Auger electron spectroscopy and x-ray photoelectron spectroscopy (XPS) measurements on the catalysts with measurements from standard iron compounds which comprise the various chemical states of iron that may be present on the catalyst surface. Efforts during this period, August 1, 1983 to December 31, 1983 have involved XPS measurements on clean and oxidized iron foils and on bulk Fe_2O_3 and Fe_3O_4 powder samples. The goal of these measurements has been to characterize the surface chemistry of these standard materials and to obtain standard iron XPS and Auger spectra.

9538 (DOE/PC/60805—T1) Cation promotion effects in zeolite-supported F-T catalysts. First quarterly report, September-November 1983. Goodwin, J.G. Jr.; Sayari, A. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). Dec 1983. Contract FG22-83PC60805. 7p. NTIS, PC A02/MF A01. Order Number DE84004676.

An investigation into zeolite-supported F-T catalysts has produced results which suggest that alkali cations, remaining in a zeolite and serving to neutralize the structure, act to promote higher hydrocarbon formation. It appears that the F-T metal must be highly dispersed throughout the zeolite in the vicinity of these cations for this promotion effect to take place. This effect is also highly dependent upon alkali cation concentration. The current research involves a study of the promotion effects of the neutralizing alkali cations on CO hydrogenation (under typical F-T conditions) over zeolite-supported Ru catalysts. Ru is a useful, model catalyst for the study of such promotion of this synthesis. First, alkali promotion has been found to have a great effect on product selectivity over Ru. Second, Ru does not form any stable carbides, thereby removing this complicating factor. Third, Ru is relatively easy to reduce to the metallic state. Fourth, Ru is the F-T metal easiest to keep inside zeolite crystallites. Fifth, under typical conditions, there is little oxygenated hydrocarbon formation or skeletal isomerization of the hydrocarbons over Ru. Thus, the neutralizing cations in the zeolite support should affect CO hydrogenation over Ru possibly by affecting: CO chemisorption, H_2 chemisorption, carbon deposition, catalytic activity, chain growth probability, selectivity for CH_4, selectivity for olefins, and diffusion in the zeolite. Preliminary results are reported.

9539 (SERI/TR—252-1310) Analysis of a process for converting biomass to diesel fuel. Benham, C.; Bohn, M. (Solar Energy Research Inst., Golden, CO (USA)). Oct 1983. Contract AC02-83CH10093. 96p. NTIS, PC A05/MF A01. Order Number DE84000059.

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This report presents a complete analysis of a specific process for converting agricultural residues into diesel fuel. The analysis includes a study of the feedstock resource and the market for diesel fuel, development of a process flow sheet based on detailed mass and energy balances, equipment and operating cost estimates, and economic anlayses based on the cost estimates. An indirect liquefaction process patterned after the Fischer-Tropsch process is used. In this case, coal is replaced by lignocellulosic materials such as wheat straw and corn stover, that become a source of carbon for the process. A high-temperature gasification or pyrolysis step is necessary to convert these carbonaceous feedstocks into the synthesis gas required in the Fischer-Tropsch process. Because the conversion process can utilize a very wide range of feedstocks (any carbonaceous material), it has many interesting potential applications. These include agriculture, municipal solid waste, forestry, food processing, feedlot, peat, etc. 39 references, 26 figures, 10 tables.

9540 **Industrial cellulosic wastes to diesel fuel.** Cranford, B. (U.S. Dept. of Energy, Washington, DC). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 5: 2099-2104(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The Office of Industrial Programs has funded the Arizona State University to develop a process for converting dry industrial cellulosic wastes to diesel fuel. The process has proved to be successful in converting industrial cellulosic wastes to diesel fuel at 125 L/T (30 gal/ton) yields. The process consists of a fluidized bed gasification step followed by an indirect catalytic liquefaction, producing both diesel fuel and propanol. This paper discusses the process, technology, waste streams, economics and ongoing efforts to build a 9 ton/day (10 ton/day) engineering test facility.

9541 **Solar gasification of carbonaceous materials.** Taylor, R.W.; Berjoan, R.; Coutures, J.P. (Lawrence Livermore Laboratory, Livermore, CA 94550). *Solar Energy;* 30: No. 6, 513-526(Jun 1983).

Charcoal, wood and paper have been gasified in a packed-bed reactor using steam and solar energy. The steam was generated by spraying water directly on to the surface of the fuel and at the same time, heating the fuel at the focus of a solar furnace. Half of the steam reacted with carbon and 30 per cent of the incident solar energy was stored as chemical enthalpy. The performance of a fluidized-bed reactor was compared to that of a packed-bed reactor using charcoal and CO_2. The fraction of the incident solar energy utilized to produce CO (stored) was 10 per cent in the case of the fluidized-bed reactor and 40 per cent for the packed-bed reactor. The fuel value of the gas produced from the steam-gasification of wood and paper was 65 kcal/mole (320 Btu/lb). On an ash free basis the volume yield of the gas was 1 + or - 0.1 m^3/kg.

9542 **Effects of mass transfer on the performance of slurry reactors used for Fischer-Tropsch synthesis.** Stern, D. (Lawrence Berkeley Lab., CA); Bell, A.T.; Heinemann, H. *Chemical Engineering Science;* 38: No. 4, 597-605(1983). Contract W-7405-ENG-48.

The influence of mass transfer on the H_2/CO ratio in the liquid phase of a slurry reactor used for Fischer-Tropsch synthesis has been analyzed theoretically. It is determined that even under circumstances where the gas-liquid mass-transfer resistance is a small fraction of the overall resistance, differences in the solubilities and diffusivities of H_2 and CO can give rise to liquid-phase H_2/CO ratios which differ substantially from that of the gas fed to the reactor. The direction and magnitude of the change in the liquid-phase H_2/CO ratio is dependent on the H_2-CO consumption ratio, the interfacial area for mass transfer from the bubble phase, the Damkohler number, and the space velocity of the feed gas.

9543 **Analysis of landfill gas enhancement data, Controlled Landfill Project, Mountain View, California.** Pacey, J.G.; Van Heuit, R.E. pp 302-311 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

This paper describes the management and monitoring of the six demonstration cells comprising the Controlled Landfill Project in Mountain View, California, presents the first 20 months of monitoring data, and provides a preliminary analysis of results to date. While it is still too early to draw definitive conclusions concerning the value of specific enhancement parameters, all cells receiving added water, sludge or buffer achieved high and stable methane concentrations in a relatively short period of time. The synergistic, if not basic, value of pH control is clearly demonstrated - every cell that received buffer has consistently shown not only a high rate of landfill gas production but also a high methane concentration. Water addition also appears to be having a clear effect on landfill gas production. The two cells which received significant water additions lead the other cells in both landfill gas production and methane production, when data are normalized on the basis of a unit weight of dry refuse.

9544 **Landfill methane trace volatile organic constituent characterization.** Zimmerman, R.E.; Lytwynyshyn, G.; Johnson, D.O.; Wilkey, M.L. pp 320-329 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Methane produced during the anaerobic decomposition of urban refuse in sanitary landfills can be removed from existing landfills, processed and utilized with technology currently available or in development. Escor, Inc., under the joint sponsorship of the Gas Research Institute and the US Department of Energy, has completed a study to determine the trace volatile organic constituents contained in landfill methane. The study results indicate volatile organics are found at levels one-to-two orders of magnitude below known threshold limit values, thus the presence of these organics should not constrain development of the landfill methane recovery industry.

0902 Alcohol Fuels

REFER ALSO TO CITATION(S) 9616, 10044, 10166

9545 **(DOE/OR/20808—T1) Market analyses relative to the Renewable Energy, Inc. ethanol plant feasibility study.** (Renewable Energy, Inc., Paducah, KY (USA); Kentucky Dept. of Energy, Lexington (USA)). 10 May 1982. Contract FG05-81OR20808. 296p. NTIS, PC A13/MF A01. Order Number DE84003887.

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The document contains three distinct studies. The first addresses the long-term outlook for corn price and availability in the Paducah region, the second deals with the marketability of Distillers' Dried Grains and Solubles (DDGS), and the third analyzes the market outlook for ethanol in the fuel and industrial sectors, with an emphasis on the Paducah region. This document does not represent the full amount of work performed by the KEAC relative to the sub-contract as assessments of the environmental permits required to locate an ethanol plant in Paducah, a land ownership study and miscellaneous bits of required information have been fulfilled over the course of the sub-contract. Appendices include: tax incentives for alcohol fuels; and state initiatives on alcohol fuels (a state-by-state compendium of laws, regulations, and other activities involving alcohol fuels). (DMC)

9546 **(DOE/PC/30276—T1) Evaluation of the slurry methanol reactor.** Shinnar, R. (City Coll., New York (USA). Dept. of Chemical Engineering). [nd]. Contract FG22-80PC30276. 17p. NTIS, PC A02/MF A01. Order Number DE84004064.

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The Chem Systems slurry process is a three phase reactor in which catalyst is suspended in a nonactive liquid, which mainly acts as a heat transfer medium. The reactor is similar to the slurry reactor for Fischer Tropsch processes described by Koelbel. It allows very good temperature control, and continuous catalyst addition and removal. If the liquid is a solvent for methanol, it also allows higher conversions of the gas as the methanol is preferentially removed from the gas inside the reactor, and can be flashed from the solvent. We have tried to evaluate the potential advantage of a slurry reactor for methanol production. The conclusion derived is that the slurry reactor has higher investment cost due to the low volumetric space velocity. Reactor volume will be about 5 to 10 times larger than in a standard packed bed. If the syngas has a sufficient H_2/CO ratio then the use of the slurry reactor has no advantage that will compensate for the inherently higher cost. On the other hand, if the hydrogen content of the syngas is low (0.5:1 to 1.2:1) (as in most advanced gaifiers), then the slurry reactor has the potential to eliminate the external shift and reduce steam requirements. This potential could lead to significant savings. There is a possibility that, with a proper catalyst, similar results of integrating the shift into the reactor could be achieved in a fixed bed reactor. Even then the slurry reactor would have the advantage of being able to use water instead of steam. It might therefore be advisable

that development of a slurry reactor for methanol should focus on converting syngas with a low H_2/CO ratio without prior shift by water injection into the reactor.

9547 **(DOE/PC/50810—T5) Promotion effects on the synthesis of higher alcohols. Fifth quarterly report, September 1983-November 1983.** Goodwin, J.G. Jr.; Chuang, S.C. (Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering). Dec 1983. Contract FG22-82PC50810. 23p. NTIS, PC A02/MF A01. Order Number DE84004258.

This paper reports on a study of the alkali promotion effect on synthesis of higher alcohols over Rh/TiO_2. Conclusions of this study are: (1) the selectivity and activity of alcohol synthesis over Rh catalysts vary with the type of support and additive; (2) activity of Rh/TiO_2 is 30 times higher than Rh/SiO_2; (3) effect of alkali promotion of Rh/TiO_2 increases in the order, $Li \leqq K \leqq Cs$; and (4) addition of alkali promoters to Rh/TiO_2 results in lower activity of CO hydrogenation, a slight increase in the selectivity of oxygenated products, and a high yield of olefins. 26 references, 6 figures, 2 tables.

9548 **(DOE/R4/10343—T1) Solar alcohol distillation system. Final report, Septemer 29, 1980-January 31, 1982.** Kennedy, B.W. (Kennedy (Bobby W.), Guntersville, AL (USA)). 23 Apr 1982. Contract FG44-80R410343. 26p. NTIS, PC A03/MF A01. Order Number DE84005304.

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Two gallons of alcohol were distilled using the solar distillation system in ten hours of operation. The rate was slower than expected, but this was attributed to two factors: alignment of the solar dish with the sun and proper shape of the parabolic dish. When the alignment varies more than two to three degrees, the systems output slows down drastically. Also, alignment of the parabolic shape of the dish was off slightly and a great deal of the energy was not striking the collector. This was due to deformation of the parabolic dish due to its own weight during assembly. Mathematical calculations show that the dish distance to collector if off more than 1/8 of an inch the efficiency is reduced greatly. More work should be done in the area of tracking and the shaping of the parabolic dish which can be accomplished relatively easy.

9549 **(DOE/R4/10343—T2) Do-it-yourself guideline for constructing a solar alcohol distillation system.** Kennedy, B.W. (Kennedy (Bobby W.), Arab, AL (USA)). 27 Jul 1982. Contract FG44-80R410343. 28p. NTIS MF A01. Order Number DE84005303.

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The development and testing of a solar powered distillation system are described. The system consists of a parabolic dish collector, a two axis sun tracking stand, sun tracking solar cell system, condenser, fermentation tanks, and continuous distillation still. The assembly instructions for the parabolic dish are included as well as the basic steps to follow in mashing and fermenting of corn meal. 15 figures. (DMC)

9550 **(NP—4770101) Biogasohol.** (Club Niederoesterreich, Vienna (Austria)). 1982. 73p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84770101.

Possible dedication of a proportion of food crop land to the cultivation of plants grown for ethanol production is taken into consideration. This would help to prevent agricultural surplus production and to reduce oil imports and, so, to unburden the balance of payment. 6 papers have been entered separately.

9551 (NP—4770101, pp 4-14) **Single/total-economy aspects of production and utilization of energy from renewable raw materials.** Meinhold, K. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

"Biosprit (biologically produced gasohol) can compete with synthetically produced ethanol for use in commerce and industries but not fully so with petrol due to the present refinery selling prices. Nevertheless, a 10% admixture will increase the price of one litre of petrol only slightly. If the consumer is not meant to cover this price increase, it could be covered by a small proportion of those expenditures which will be saved through a changeover to biogasohol production and which have been payed for necessary export refunding so far. Even at present, there is a considerable benefit involved for the overall national economy if there was a changeover to biogasohol production. In terms of total economy, transitional or initial subsidization would be just as justified as it is with initial promotion by the government with the introduction of new technologies.

9552 (NP—4770101, pp 16-21) **Sugar industry - number 1 with biogasohol.** Vogler, K. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

In our latitudes and under our average climatic conditions, sugar beet, by far, is the plant with the highest annually recurrent assimilation output per area unit for energy production purposes. According to the biogasohol project of the sugar industry, freshly produced sugar-beet juice will constitute the base material for processing during beet harvesting periods, whereas, at other times, a storable juice produced during harvesting periods and molasses will be processed to alcohol. This would guarantee whole-year full operation of the alcohol factory.

9553 (NP—4770101, pp 22-28) **Straw as an alternative.** Lunacek, H. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

The best chances of standing their ground in terms of profitability lie with those processes which are suitable for the production of valuable intermediate products (e.g. for the food or forage sectors, for the pharmaceutical or chemical industries) next to alcohol and cellulose from available plant residues. Due to their profits from sales, these products should enable the producer to sell the alcohol produced in this way at a price in line with real market conditions. The processes concerned enjoy a genuine chance of realization as long as they concentrate on the specific raw materials typical of the region concerned and try to reach a price corrresponding to the market - be it in the sector of energy or of food stuffs or else - by means of optimum utilization of by-products.

9554 (NP—4770101, pp 30-42) **Biosprit - avoiding faulty planning.** Wohlmeyer, H. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

Within the framework of ethanol research there are two current projects representing multi-raw-material systems and multi-purpose systems with ecological optimum combination. Both facilities draw a large proportion of their process heat from waste heat. Animal stocks at both sites are so high as to allow optimum utilization of by-products.

9555 (NP—4770101, pp 44-62) **Decentralized biogasohol model of the agricultural ethanol distilleries.** Schmidt, R. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

According to the view taken by the Agricultural Distilleries of Austria, a decentralized model offers itself for a realization of an Austrian power-alcohol programme. This model briefly explained is to constitute a contribution to the discussion which neither claims completeness nor exclusiveness. It is true to the very nature of a decentralized form of organization that it may harbor many variants allowing different solutions for the individually assessed problems involved. In any case, the agricultural distilleries offer various positive preconditions for a rapid entry into an Austrian power-alcohol programme. Regional planning with its high political order of rank and rediscovery of the village as the area of life and work of our farmers gives us the hope that our suggestion may represent a basis for discussion among those in charge of decision making, too.

9556 (NP—4770101, pp 63-70) **Biogasohol - a necessity of national economy.** Riegler, J. 1982. (In German). NTIS (US Sales Only), PC A04/MF A01.

In Biogasohol.

Next to direct savings in energy imports, biogasohol production or energy production from biomass, resp., would exempt land from crop cultivation and contribute to an unburdening of the export side of our agricultural foreign trade. With alcohol production from corn, maize and other starch-containing plants, only the starch is used, not the whole plant. Protein and fat components are maintained and can be used for foodstuffs.

9557 **(NP—4770110) Methanol fuel M 100 - development and technology.** Mueller, H.; Keim, K.H. (Union Rheinische Braunkohlen Kraftstoff A.G., Wesseling/Koeln (Germany, F.R.)). [nd]. 20p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84770110.

Research and development activities are concentrated on production, storage and testing of methanol fuel M 100 for propulsion of Otto and Diesel engines.

9558 **(ORNL/TM—8722) Kinetic study of ethanol production by Zymomonas mobilis.** Worden, R.M.; Donaldson, T.L.; Shumate, S.E. II; Strandberg, G.W. (Oak Ridge National Lab., TN (USA)). Dec 1983. Contract W-7405-ENG-26. 66p. NTIS, PC A04/MF A01. Order Number DE84005064.

This study has investigated the effects of temperature, pH, glucose concentration, and ethanol concentration on the fermentation kinetics of the ethanol-producing bacterium Zymomonas mobilis (ATCC 10988). The effects of these parameters on the specific growth rate and the specific ethanol production rate of Z. mobilis were studied in batch and continuous culture. Initial-rate batch experiments were used to investigate the temperature, pH, and glucose concentration parameters. The growth medium was an aqueous solution of glucose (5 to 20%), yeast extract (Difco, 0.5%) and succinate (0.01 M). The effects of temperature on the specific growth and ethanol production rates were consistent with the Arrhenius Law in the range of 24 to 35°C. The measured activation energy was 2.5 x 10^4 J/mol in both cases. The temperature corresponding to maximum specific growth rate was 35°C, and the maximum specific ethanol production rate occurred at 37°C. At higher temperatures, the rates declined rapidly. At 36°C, maximum cell growth rates were found over the pH range 5.6 to 7.5, and maximum ethanol production rates were found over the pH range 5.2 to 7.5. Specific growth rates were more sensitive to acidic conditions than were ethanol production rates. At 36°C, reaction rates were shown to increase with increasing glucose concentration up to approximately 10% and then to decline at higher concentrations. Classical kinetic models incorporating substrate inhibition could not be fit to the experimental data, suggesting that simple substrate inhibition may not be the primary mechanism responsible for the declining rates at high glucose concentrations. 53 references, 13 figures, 9 tables.

9559 **Theoretical limits of engine economy with alternative automotive fuels.** Sung, N.W. (Department of Mechanical Engineering and Applied Mechanics, University of Michigan, Ann Arbor, Michigan 48109). *International Journal of Energy Research;* 7: No. 2, 121-128(Apr 1983). Contract AC02-84ER40126.

Calculations have been made of the theoretical limits of engine efficiency for various fuels. Considered were methanol, ethanol, benzene, iso-octane, ethane and methane. The ideal Otto cycle was used for the calculations, since it represents the upper limit for fast-burn adiabatic engines. At the conditions explored, small differences in thermodynamic cycle efficiency of under 2 percent exist among the various fuels. These differences can be explained by the thermodynamic properties of the fuel/air mixtures themselves.

0904 Solid Waste And Wood Fuels

REFER ALSO TO CITATION(S) 9601, 9614, 10468, 10657

13 HYDRO ENERGY

REFER ALSO TO CITATION(S) 9583, 10044

9560 **(TVA/ONR/WR—84/1) Operation of TVA reservoirs: annual 1980.** (Tennessee Valley Authority, Knoxville (USA). Office of Natural Resources). Oct 1983. 203p. NTIS, PC A10/MF A01. Order Number DE84900614.

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This report describes the operation of TVA, ALCOA, and Cumberland Basin reservoirs that were scheduled daily by Reservoir Operations Branch personnel during calendar year 1980. These include all TVA reservoirs, eight reservoirs in the Cumberland River Basin owned by the US Army, Corps of Engineers, and six reservoirs in the Tennessee River Basin owned by ALCOA. In addition, storage and flow computations include Walters Reservoir, operated by Carolina Power and Light Company; and Woods Reservoir, operated by the US Air Force. Plates are included in this report tabulating daily elevations, storage volumes, and/or average discharges for 48 reservoirs for 1980. Additional plates are included for the daily average flow in Barkley Canal, monthly and annual emptyings and water use at each lock in the Tennessee River Basin, monthly and annual capacity factors at each TVA scheduled hydro plant, combined monthly and annual storage and flows (in inches) for reservoirs above Chickamauga and Kentucky Dams, and a summary of Reservoir Operations. Tables of monthly and annual storage and flows (in inches) for the principal Tennessee River Basin tributary projects are included at the end of their respective annual operations summary. Individual plottings of midnight reservoir elevations are included for the principal tributary storage reservoirs and Normandy Reservoir. Group charts are included showing midnight reservoir elevations for other tributary reservoirs, the Tennessee River reservoirs, and the principal Cumberland Basin reservoirs.

1301 Resources And Availability

9561 **(NP—3751371) List of reports, etc. on hydroelectric power investigations in Greenland as of June 30, 1983.** (Ministeriet for Groenland, Copenhagen (Denmark)). Jun 1983. 19p. (In Danish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83751371.

The investigations of hydroelectric power utilities in Greenland have been studied increasingly during the last years, and especially investigations of urban energy supply by hydroelectric power. The bibliography covers both public and private investigations. Some reports on other energy sources are also included.

1303 Plant Design And Operation

9562 **(DOE/R4/20006—T36) Brief reconnaissance study for the addition of hydropower for Banner Elk Dam, Banner Elk, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 4 Apr 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84004452.

The following are presented: summary sheet; site description; business data; environmental; institutional; and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of hydroelectric power at this site appears to be economically feasible. (MHR)

9563 **(DOE/R4/20006—T37) Brief reconnaissance study for the addition of hydropower for Cecil Murray Dam, Ennice, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 30 Mar 1983. Contract AC44-80R420006. 21p. NTIS, PC A02/MF A01. Order Number DE84005309.

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The following are presented: summary sheet; site description; business data; environmental; institutional; and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of hydroelectric power at this site does not appear to be economically feasible. (MHR)

9564 **(DOE/R4/20006—T38) Brief reconnaissance study for the addition of hydropower for Gunpowder Dam No. 1, Granite Falls, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). Apr 1983. Contract AC44-80R420006. 21p. NTIS, PC A02/MF A01. Order Number DE84004694.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of hydroelectric power at this site appears to be economically feasible, if the cost of money is less than 13%. (MHR)

9565 **(DOE/R4/20006—T39) Brief reconnaissance study for the addition of hydropower for Tampa Dam, Tampa, Florida.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). Feb 1983. Contract AC44-80R420006. 22p. NTIS, PC A02/MF A01. Order Number DE84004453.

Portions are illegible in microfiche products.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of hydroelectric power at this site appears to be economically feasible. (MHR)

9566 **(DOE/R4/20006—T40) Brief reconnaissance study for the addition of hydropower for Lake Manatee Dam, Bradenton, Florida.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 24 Feb 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84005091.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of hydroelectric power at this site does not appear to be economically feasible. (MHR)

9567 **(DOE/R4/20006—T41) Brief reconnaissance study for the addition of hydropower for Geiger Lake Dam, Hattiesburg, Mississippi.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). Feb 1983. Contract AC44-80R420006. 19p. NTIS, PC A02/MF A01. Order Number DE84005087.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the development of small scale hydroelectric power at this site does not appear to be economically feasible. (MHR)

9568 **(DOE/R4/20006—T42) Brief reconnaissance study for the addition of hydropower for Randolph Mills No. 1 Dam, Franklinville, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). Mar 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84003643.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the development of hydroelectric power at this site appears to be economically feasible. (MHR)

9569 **(DOE/R4/20006—T43) Brief reconnaissance study for the addition of hydropower for Randolph Mills No. 2 Dam, Franklinville, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 28 Mar 1983. Contract AC44-80R420006. 18p. NTIS, PC A02/MF A01. Order Number DE84004571.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the development of hydroelectric power at this site appears to be economically feasible. (MHR)

9570 **(DOE/R4/20006—T44) Brief reconnaissance study for the addition of hydropower for Fairfield Lake Dam, Sapphire, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 26 Apr 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84004445.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the development of small-scale hydroelectric power at this site does not appear to be economically feasible. (MHR)

9571 **(DOE/R4/20006—T45) Brief reconnaissance study for the addition of hydropower for Western Carolina University Dam, Cullowhee, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 25 Apr 1983. Contract AC44-80R420006. 21p. NTIS, PC A02/MF A01. Order Number DE84004448.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the installation of new hydroelectric equipment at this site appears to be economically feasible. (MHR)

9572 **(DOE/R4/20006—T46) Brief reconnaissance study for the addition of hydropower for Ward Dam, Sugar Grove, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 1 Apr 1983. Contract AC44-80R420006. 19p. NTIS, PC A02/MF A01. Order Number DE84004679.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the addition of hydroelectric generators appear to be economically feasible at this site. (MHR)

9573 **(DOE/R4/20006—T47) Brief reconnaissance studies for the addition of hydropower in Puerto Rico. Report No. 2.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). Dec 1983. Contract AC44-80R420006. 78p. NTIS, PC A05/MF A01. Order Number DE84005310.

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Nine dams and hydroelectric sites were visited during a trip to Puerto Rico in August 1983. Seven brief reconnaissance reports were prepared to describe the hydroelectric potential at those sites. Information on Isabela Plant No. 4 was summarized, and a small diversion dam on Rio Turabo was not reported because the only head that could be developed was four feet. Site description and data, plant characteristics and power potential, project economics, and photographs are included for each site. Of the seven sites that were evaluated, the economic feasibility of hydroelectric development was positive for three, marginal for one, and negative for three.

9574 **(DOE/R4/20006—T48) Brief reconnaissance study for the addition of hydropower for Henry River Dam, Morganton, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 29 Mar 1983. Contract AC44-80R420006. 21p. NTIS, PC A02/MF A01. Order Number DE84004174.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the development of hydroelectric power does not appear to be economically feasible at this site. (MHR)

9575 **(DOE/R4/20006—T49) Brief reconnaissance study for the addition of hydropower for Tate Dam, Boone, North Carolina.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 31 Mar 1983. Contract AC44-80R420006. 19p. NTIS, PC A02/MF A01. Order Number DE84005308.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It is concluded that the repair of the hydroelectric equipment at this site appear to be economically feasible if the cost of money is less than ten percent. (MHR)

9576 **(DOE/R4/20006—T50) Brief reconnaissance study for the addition of hydropower for Moss Bluff Lock and Spillway, Moss Bluff, Florida.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 24 Feb 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84005090.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the economic feasibility of developing small scale hydroelectric power at this site appears to be marginal. (MHR)

9577 **(DOE/R4/20006—T51) Brief reconnaissance study for the addition of hydropower for Downings Mill Dam, Choccolocco, Alabama.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 23 Feb 1983. Contract AC44-80R420006. 19p. NTIS, PC A02/MF A01. Order Number DE84005089.

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The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. The development of small scale hydroelectric power at this dam does not appear to be economically feasible. (MHR)

9578 **(DOE/R4/20006—T52) Brief reconnaissance study for the addition of hydropower for Autauga Creek Dam, Prattville, Alabama.** Gebhard, T.G. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 23 Feb 1983. Contract AC44-80R420006. 20p. NTIS, PC A02/MF A01. Order Number DE84005088.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the economic feasibility of hydroelectric power at this site appears to be marginal. (MHR)

9579 **(DOE/R4/20006—T53) Brief reconnaissance study for the addition of hydropower for Percy Quin Dam, McComb, Mississippi.** Gebhard, TG. Jr. (Gebhard (Thomas G.), Austin, TX (USA)). 25 Feb 1983. Contract AC44-80R420006. 22p. NTIS, PC A02/MF A01. Order Number DE84005086.

Portions are illegible in microfiche products.

The following are presented: summary sheet; site description; business data; environmental, institutional, and safety data; plant characteristics and power potential; project economics; and photographs. It was concluded that the development of small-scale hydroelectric power at this site does not appear to be economically feasible. (MHR)

1305 Economics And Management

9580 **(NP—3770168) STEWEAG business report 1981.** (Steirische Wasserkraft- und Elektrizitaets-A.G. (STEWEAG), Graz (Austria)). 1982. 45p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83770168.

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The report of the executive board comprises general survey, energy industry, operational processes, new buildings, personnel financial management, explanations on the annual balance 1981. Suggestions concerning the transfer of the company's net loss to a new account are made. At the end the balances of 1980 and 1981, a loss and profit account as well as a survey of the assets are given.

14 SOLAR ENERGY

9581 **(DOE/CE/30719—T1) Renewable Energy Program support. Final report.** (Meridian Corp., Falls Church, VA (USA)). 1983. Contract AC01-82CE30719. 315p. NTIS, PC A14/MF A01. Order Number DE84003866.

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Technical, operational and analytic support and assistance to the Renewable Energy offices and divisions is completed. The overall work effort was characterized by timely, comprehensive, high quality, professional responsiveness to a broad range of renewable energy program operational support requirements. Support was provided to the office and technical staff of the Deputy Assistant Secretary for Renewable Energy, the three subordinate renewable energy offices and five program divisions, throughout a period characterized by internal reorganizations, the realignment of external resources and responsibilities, policy, guidance and priority changes, and reduced budgetary support. These modifications necessitated massive programmatic changes, the alteration of annual operating and multi-year program plans, the modification of long established program baseline schedules, milestones and objectives and the reapportionment of funds. As a result of the magnitude and comprehensiveness of this fundamental programmatic restructuring, requirements for services and support changed perceptible to meet needs for information regarding current conditions and statuses, the analysis of alternative courses of action, and for assessments and evaluations which assisted program directors to make determinations and decisions which best brought their programs into the required new structure and posture. Ancillary support needs, to produce reviews and presentations, and to assist in the evaluation of briefing and recommendations of field agencies also increased markedly. Reports on each of the technologies are given.

9582 **(SERI/SP—722-1127) Microcomputer methods for solar design and analysis: passive and active systems.** (Solar Energy Research Inst., Golden, CO (USA)). Feb 1981. Contract AC02-77CH00178. 23p. NTIS, PC A02/MF A01. Order Number DE84003462.

This brochure is intended to serve as a source guide for available software packages to be used on a variety of microcomputers. Programs were only included which were felt to be fully supported via documentation and direct user assistance. Over 30 programs are included. (MHR)

9583 **(SERI/SP—744-1126) Guidebook to renewable energy technologies. Community renewable energy guidebook series.** Green, B.; Glenn, B.; Pinkerton, A.; Ohi, J. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1981. Contract AC02-77CH00178. 133p. NTIS, PC A07/MF A01. Order Number DE84003396.

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This guidebook presents an overview of 23 renewable energy technologies and concepts. This overview is primarily meant to demystify these technologies for individuals without engineering or scientific backgrounds. This guidebook should also

convey to the reader the state of the art of these technologies and the promise and merit of their use. The technologies are regionally diverse and can be matched to local needs and desired scale. For example, wind power and hydropower show good potential for application in the Northeast where electricity prices are high and the wind resource is regionally promising. These technologies can also contribute to local and regional economic growth and can help the outflow of local dollars used to pay for ported energy (imported into the country, into region, or into a local area). These technologies may also lessen local environmental problems. For example, conversion of municipal solid to energy may ease the demand on landfill for dumping and sanitary disposal. Topics include heat; hybrid passive-active solar heating; cooling; liquid fuels; gaseous fuels, electricity; daylighting; and integrated energy systems.

1401 Resources And Availability

9584 **(PB—83-254995) Estimation of totals of global solar radiation on a horizontal surface from UK average meteorological data. Research report.** Munroe, M.M. (Bradford Univ. (UK). Postgraduate School of Electrical and Electronic Engineering). Apr 1979. 20p. NTIS, PC E03/MF E03.

Whilst work had been done on estimating the average daily radiation for each calendar month, on tilted surfaces, the objective of this study was to express average U.K. values of global solar radiation on a horizontal surface in terms of two main equations. The first of these expressed the average daily total energy as a function of the day of the year; the second gave the time distribution of the daily total, with special reference to values obtained at Kew in southern England. Comparisons were made between estimated and observed values. The equations summarized, for the U.K., the mean daily totals of global solar radiation on a horizontal surface with a level of accuracy of about 20 per cent. The daily variation curves could be used to estimate hourly totals of shorter duration for any given day.

9585 **(SERI/SP—642-1037) Solar radiation energy resource Atlas of the United States.** (Solar Energy Research Inst., Golden, CO (USA)). Oct 1981. Contract AC02-77CH00178. 914p. NTIS, PC A99/MF A01 - GPO. Order Number DE84005105.

This Atlas presents the geographical, seasonal, and diurnal distribution of the available solar radiation energy resources in the United States, together with relevant meteorological data. This information is presented in the form of contour maps and graphical plots. The contour maps are of global, direct normal, and diffuse solar radiation. The graphical plots depict the quantitative statistical characteristics of the solar radiation energy for a total of 26 selected stations. (MHR)

9586 **Correlations of solar insolation and wind data for SOLMET stations.** Randall, D.E.; Grandjean, N.R. (Sandia National Laboratories, Albuquerque, NM 87185). *Journal of Solar Energy Engineering;* **105**: No. 2, 168-173(May 1983). Contract AC04-76DP00789.

Correlations of direct solar insolation and windspeed data based upon a 12.5-year period are presented for 26 SOLMET stations distributed over the contiguous United States. These correlations indicate that for all 26 stations 97.5 percent of the available direct insolation occurs at windspeeds of 15 m/s (33.6 mph) or less for three different solar collector tracking apertures. These results imply that operational wind load design criteria for tracking collector devices may be less stringent than is required for survival criteria in the stow orientation. Additional selected frequency distributions for direct insolation, windspeed, and wind direction data spanning the 1952-1964 time frame are also presented.

9587 **On the use of spectral radiance models to obtain irradiances on surfaces of arbitrary orientation.** Sweat, M.E.; Carroll, J.J. (Department of Land, Air and Water Resources, University of California, Davis, CA 95616). *Solar Energy;* **30**: No. 4, 373-378(Apr 1983). Contract AC01-81EV10737.

A LOWTRAN 5 based flux model has been developed to calculate downwelling infrared irradiance from transmittance/radiance code LOWTRAN 5 which can calculate the radiance from the atmosphere for user defined paths, atmospheric conditions and spectral intervals included in the model is the addition of a zeroth order scattering approximation to the LOWTRAN 5 code, methods of integrating LOWTRAN 5 calculated radiances over the sky hemisphere to obtain the downwelling flux, and a method for calculating the radiance from the atmosphere at wavenumbers outside the range of LOWTRAN 5. The accuracy of this model is verified by comparison of calculations based on radiosonde data with surface flux measurements taken concurrent with radiosonde ascent. Agreement is excellent for both horizontal and tilted surfaces with the deviation between measurements and calculations of the flux on a horizontal surface being less than 4 per cent.

9588 **Insolation in Puerto Rico.** Lopez, A.M.; Soderstrom, K.G. (Center for Energy and Environment Research, University of Puerto Rico, Mayaguez). pp 70-75 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The geographical and temporal distribution of insolation in the Caribbean island of Puerto Rico has been studied through the analysis of precise measurements at six sites. Significant differences among the sites have been found. A relatively uniform distribution of horizontal insolation during the year is a common feature not found at temperate latitudes. A simple correlation between annual insolation and precipitation was determined. Significant differences in the correlation between daily diffuse and global insolation at the different sites were found. These correlations also differ from those reported at most continental sites.

1403 Economics

REFER ALSO TO CITATION(S) 9642

9589 **(SERI/TR—214-1965) Advanced photovoltaic module costing manual.** Jackson, B.; Glyman, J.; McGuire, P.; Henry, P.; Awaya, H.; Burger, D.; Herman, S. (Solar Energy Research Inst., Golden, CO (USA); Jet Propulsion Lab., Pasadena, CA (USA)). Nov 1983. Contract AC02-83CH10093. 175p. NTIS, PC A08/MF A01. Order Number DE84000029.

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This report provides the basic information needed to prepare production cost estimates for advanced photovoltaic (PV) modules. The methodology used and the principal sources of information are built around manufacturing process descriptions or basic production units (BPUs). The standard for preparing production cost estimates of PV modules is the Solar Array Manufacturing Industry Costing Standards (SAMICS) methodology, developed by Jet Propulsion Laboratory. The SAMICS methodology defines the information required to estimate PV module production costs, supplies a formal procedure for using the information to prepare cost estimates, and provides a catalog of cost information on many of the inputs used in the production of solar cell modules. This report extends and simplifies the application of the SAMICS methodology by providing BPUs that are representative descriptions of the principal manufacturing processes used in advanced photovoltaic module production.

1404 Environmental, Legal, And Institutional Aspects

REFER ALSO TO CITATION(S) 9611

9590 **(SERI/SP—751-1051) 1981 Solar Energy Technical Training Directory. Third edition.** (Solar Energy Research Inst., Golden, CO (USA)). May 1981. Contract AC02-77CH00178. 83p. NTIS, PC A05/MF A01. Order Number DE84003463.

Solar energy technical training is defined to include all programs or courses offered by post-secondary educational institutions

that lead to a degree or substantial training skill in a solar or solar-related vocational or technical field. Technical skills range from design and installation to the maintenance of solar energy systems or components. This directory lists all schools which offer a technical degree - usually a certificate, associate, or equivalent - in a solar or solar energy-related area. In most cases, the institutions offering these programs consisted of vocational/technical schools and junior or community colleges. All schools listed in the 1981 directory have responded at least once in the last two years to the national solar education survey. Data which is over one year-old is marked with an asterick after the course or program listing. In all, the 1981 Solar Energy Technical Training Directory contains information from over 150 schools.

1405 Solar Energy Conversion

REFER ALSO TO CITATION(S) 9535, 9539, 9541, 9545, 9548, 9549, 9550, 9552, 9554, 9555, 9556, 9558, 9589, 9666, 9680, 9724, 10167, 10307, 10468, 10767, 10825

9591 **(CONF-8211134—) Semi-liquid manure treatment, energy engineering and preservation of feeding stuffs.** (Bayerische Landesanstalt fuer Landtechnik, Freising (Germany, F.R.)). 1983. 111p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84770094.

From Meeting on semi-liquid manure treatment, energy engineering and preservation of feeding stuffs; Vilshofen, F.R. Germany (9 Nov 1982).

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The papers of this information meeting deal with technical problems of manure processing and distribution, technical improvements of biogas plants, use of alternative energy sources and practical experiences in the preservation of feeding stuffs.

9592 (CONF-8211134—, pp 41-57) **Technical improvements of biogas plants.** Perwanger, A. 1983. (In German). NTIS (US Sales Only), PC A06/MF A01.

From Meeting on semi-liquid manure treatment, energy engineering and preservation of feeding stuffs; Vilshofen, F.R. Germany (9 Nov 1982).

Experience in the construction and operation of more than 40 new biogas plants in Bavaria has shown that gas-tightness, corrosion resistance and prevention of obstruction are the most important points. Gas-tightness was a problem especially in brick or concrete fermenters.

9593 **(DOE/ER/04178—7) Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, November 30, 1982-November 29, 1983.** Wrighton, M.S. (Massachusetts Inst. of Tech., Cambridge (USA)). Nov 1983. Contract AC02-76ER04178. 6p. NTIS, PC A02/MF A01. Order Number DE84005321.

Developments are reported in the reduction of an aqueous equivalent of CO_2: bicarbonate to formate under mild conditions. Also reported is work on charge transport in the two redox levels of bipyridinium-based polymers on electrodes. (LEW)

9594 **(DOE/ER/10532—T1) Investigation of chemical spray and electrodeposition techniques for the growth of thin film CdTe solar cell materials. Final report.** Boone, J.L.; Van Doren, T.P. (Missouri Univ., Rolla (USA). Dept. of Electrical Engineering). Nov 1982. Contract FG02-79ER10532. 120p. NTIS, PC A06/MF A01. Order Number DE84005335.

This work is concerned with the spray pyrolysis and electrodeposition of thin CdTe films. Cadmium telluride films have been successfully formed by both chemical spray pyrolysis and electrodeposition. The sprayed films range in thickness from 1 to 4 μm and have grain sizes of the order of 1 μm. These films have optical and electrical characteristics which are quite similar to bulk crystalline material. The electrodeposited films range up to 2 μm and appear to have less crystalline order than the sprayed films. The spray pyrolysis effort has involved the study of spray solutions, substrate temperatures, and spray rates as they relate to rate of film growth, purity of the material and crystal size. We have also investigated impurity doping from solution and the formation of spray pyrolized heterojunctions. The electrodeposition effort has involved the study of electrolytes, types of substrates, ion transport processes and deposition potentials as they relate to film growth, purity and crystal size. We have paid particular attention to the control of stoichiometry, which may be achieved through variations in the deposition parameters.

9595 **(DOE/ER/13026—1) Low cost, sprayed $CuInSe_2$ solar cell research. First annual progress report, September 15, 1982-September 15, 1983.** Turcotte, R.; Lund, J.; Moy, L.; Squillante, M.; Entine, G. (Radiation Monitoring Devices, Inc., Watertown, MA (USA)). 1983. Contract AC02-82ER13026. 28p. NTIS, PC A03/MF A01. Order Number DE84005339.

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This program is examining a promising new spray pyrolysis technique to deposit thin films of $CuInSe_2$ for terrestrial solar cell applications. This technique is very attractive for depositing high quality thin film $CuInSe_2$ solar cells due to its inherent simplicity and potential low cost. The initial six months of the program focused on studying the solution chemistry and process parameters needed to deposit $CuInSe_2$ by this new method. Progress during the early period was achieved by developing very stable chemical spray solutions for $CuInSe_2$ deposition. As a result of this progress, we were successful in depositing $CuInSe_2$ films which exhibited both p- and n-type conductivity. The tailoring of the conductivity type was achieved by varying the solution concentration ratios of copper to indium. Sprayed $CuInSe_2$ films exhibiting n-type conductivity with resistivities in the 10^3 to 10^5 ohm cm range were deposited from indium rich solutions. The p-type conductivity with resistivities in the 10^{-2} to 10^2 ohm cm range were typical of near stoichiometric ratios of copper to indium. Preliminary Schottky barrier and heterojunction devices were fabricated during the initial six months. These early devices showed encouraging results. During the next six months dramatic improvements in the device parameters were achieved. Open circuit voltages in excess of 350 mV, short circuit current densities up to 7 mA/cm^2 and fill factors up to 30% have been observed. These devices have remained stable for three months without any decrease in performance. The AMI conversion efficiency is rapidly approaching 1.0%. The preliminary results have been very encouraging and many of the limitations impeding progress have been identified. We are confident that we will succeed in producing $CuInSe_2$ solar cells of sufficiently high conversion efficiency to demonstrate the value of the new spray pyrolysis technique.

9596 **(DOE/JPL/954527—83/25) Investigation of test methods, material properties, and processes for solar cell encapsulants. Twenty-fifth quarterly progress report.** Willis, P.B.; Baum, B. (Springborn Labs., Inc., Enfield, CT (USA)). Sep 1983. Contract NAS-7-100-954527. 65p. NTIS, PC A04/MF A01. Order Number DE84005084.

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The goal of the program is to identify, test, evaluate and recommend encapsulation materials and processes for the fabrication of cost-effective and long life solar modules. During the past quarter these investigations have included continued investigations of accelerated aging techniques for module component lifetime studies, an investigation of candidate outer cover films and continued evaluation of soil-repellant coatings. A program of accelerated aging is being conducted for the purpose of: (1) generating empirical and practical data relating to longevity; (2) rating and ranking of the stability of candidate formulations; and (3) generating data that may be used in mathematical model for the prediction of service life. In this report the results of RS/4 sun-lamp are compared for dry conditions versus that incorporating a water spray cycle. The results of 10,000 hours of this type of accelerated aging show that the water spray (simulating rain extraction) imposed no additional stress on almost all of the specimens tested. Outer cover films are required for the protection of substrate designed modules in which the cells are supported from the underside. The outer cover must be highly transparent and weatherable. Initially, it was thought that uv screening was also a necessity, however, most of the candidate pottants are sufficiently stable that the additional pro-

tection may not be required. This now increases the number of materials that might be suitable for this application.

9597 **(DOE/JPL/956046—83-17) Intrinsic gettering in EFG ribbons by pre-diffusion anneal at high temperatures. Quarterly report, July 1, 1983-September 31, 1983.** Gleichmann, R.; Ast, D.G. (Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science and Engineering). Sep 1983. Contract NAS-7-100-956046. 26p. NTIS, PC A03/MF A01. Order Number DE84005466.

The defect structure of standard un-processed EFG material has been studied extensively. EFG material contains a fairly high density of dislocations and coherent twin boundaries which have an electrical effect only when they contain dislocations. Twins of different orientation form twin joins of higher order and these higher order twins are electrically active when they contain an asymmetric boundary plane. Some of these defects can rearrange themselves during subsequent heat treatments, e.g., during junction formation. Results obtained so far indicate that dislocations tend to arrange themselves into low angle tilt boundaries, and that small precipitates are formed at some, but not all dislocation nodes. The aim of the present report was to investigate if similar annealing induced changes in the defect structure could be responsible for the considerable improvement in the cell efficiency when ribbons were preannealed for one hour at high temperatures prior to diffusion.

9598 **(DOE/JPL/956312—05) Stress studies in EFG. Quarterly progress report, July 1, 1983-September 30, 1983.** (Mobil Solar Energy Corp., Waltham, MA (USA)). 15 Dec 1983. Contract NAS-7-100-956312. 37p. NTIS, PC A03/MF A01. Order Number DE84004481.

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Experimental work in support of stress studies in high speed silicon sheet growth has been emphasized in this quarter. Creep experiments utilizing four-point bending have been made in the temperature range from 1000°C to 1360°C in CZ silicon as well as on EFG ribbon. Creep is found to be strong, even at the lower temperatures. Important differences in primary creep are observed with silicon impurity content in the higher temperature regions. A method to measure residual stress over large areas using laser interferometry to map strain distributions under load is under development. The experimental system to make these measurements on CZ silicon has been built and tested. A fiber optics sensor to measure ribbon temperature profiles has been constructed and is being tested in a ribbon growth furnace environment. It has been necessary to enclose the optical fibers in a water-cooled jacket to improve reproducibility and reliability of the sensor. Stress and temperature field modeling work has been directed toward improving various aspects of the finite element computing schemes. Difficulties in computing stress distributions with a very high creep intensity and with non-zero interface stress have been encountered and additional development of the numerical schemes to cope with these problems is required. Temperature field modeling has been extended to include the study of heat transfer effects in the die and meniscus regions and efforts are underway to improve the overall scheme of calculating interface region temperature profiles for real system geometries.

9599 **(LBL—16117) Growth and characterization of single crystal (Cd, Zn)S thin films relevant to the study of the (Cd, Zn)S/Cu/sub x/S photovoltaic cell.** Chin, B.L. (Lawrence Berkeley Lab., CA (USA)). Aug 1983. Contract AC03-76SF00098. 146p. NTIS, PC A07/MF A01. Order Number DE84003288.

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Single crystal (Cd,Zn)S thin films of varying compositions were deposited by a hot-wall vacuum deposition technique to eliminate the effects of grain boundaries and to provide a planar interface. The heteroepitaxial films were grown on both (111) and off-(111) GaAs and (111) Ge substrates. The deposited films were characterized using x-ray diffraction, SEM-EDAX and Hall mobility measurements. The composition and growth rate depended very strongly upon the ratio of ZnS to CdS evaporated and the substrate surface. Heterojunctions with Cu/sub x/S were formed by both a solid-state ion exchange reaction and reactive sputtering. Current-voltage characteristics and spectral response data were measured on completed devices. Compositional Auger electron spectroscopy depth profiling was performed on heterojunctions using both processes for forming the Cu/sub x/S layer. A sharp interface was found for the reactively sputtered Cu/sub x/S/II-VI heterojunction whereas a diffuse interface existed for the ion-exchange formed Cu/sub x/S. Relative sensitivity factors were calculated using fixed compositions and sulfur as the standard. For the heterojunction formed by the ion-exchange reaction on (Cd, Zn)S, an excess of Zn and Cd in the form of a second phase at the interface was determined.

9600 **(NE—1983-5) IEA Forestry Energy. Annual Report 1982.** (National Swedish Board for Energy Source Development (NE), Stockholm). Jan 1983. 39p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751387.

It is the purpose of the co-operation to establish increasing programme and project collaboration between the participants in the field of Forestry Energy which is defined as the use of short rotation forestry biomass and forestry residues to produce clean fuels, petrochemical substitutes and other energy-intensive products. Progress in area B, growth and production was impressive, and good in area C, Harvesting Progress. In area D, Conversion was slow.

9601 **(NE-EO—82-12) Storing of saplings of Salix spp.** Thoernqvist, T. (Naemnden foer Energiproduktionsforskning, Stockholm (Sweden)). 1982. 72p. (In Swedish). (SLU-IVL—133). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751378.

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This investigation was initiated in order to determine the most appropriate form for storing logged energy wood that had been intensively cultivated. The trial consisted of: A) A chip pile of 85 m^3s B) A pile of short lengths of wood (billets) of 100 m^3s C) Saplings in bundles which were on average 4.9 meters long and 0.45 meters in diameter. The percentage of dry bark and wood in the chip pile was determined by taking eleven chip samples. The mean values show that the material consisted of 76 % wood and 17 % bark. The remaining 7 % was branches of less than 3 mm, and fines which could not be classified as bark or wood. These results also apply to the billets and bundles. The chips and the bundles were laid up immediately after felling and had an initial moisture content of 50.9 %. The billets were laid up six weeks later from wood which had been felled for one month. They had a moisture content of 46.7 % at the beginning of the trial. The mean moisture content after the storing time was for the chip pile estimated to 48.5 %, for the billet pile 36.2 % and for the bundles 36.5 %. In both the piles dry matter losses were greater in the moist zones than in the dry. Average loss of dry matter was 14.1 % for the chip pile, 5.8 % for the billets and 4.8 % for the bundles. After storage the energy value of the materials was reduced by 13 % for the chips but increased by 0.5 % for the billets and by 1.6 % for the bundles. During the storage time the total amount of viable fungal particles in the chip pile increased 690-16000 times, in the billets pile 15-830 times and in the bundles 14-66 times.

9602 **(NYSERDA—83-18) Marine biomass: New York State species and site studies. Annual report, December 1, 1981-November 30, 1982.** Squires, D.F.; McKay, L.B. (eds.). (New York Sea Grant Inst., Albany (USA); Cornell Univ., Ithaca, NY (USA)). Oct 1983. 212p. Department of Communications, NY 12223SERDA, Two Rockfeller, Plaza, Albany, NY.

Highlights of progress accomplished during 1982 are summarized. The purposes of this project are: to design a biological test farm for marine biomass of sufficient size to permit future experimental research on a two-crop system, to provide the necessary biological data to support the test farm design phase, and to initiate the work necessary to seed the farm. Separate abstracts have been prepared to describe each phase of the progress in these areas for inclusion in the Energy Data Base. The goal of the program is to produce methane from aquatic biomass at a reasonalbe cost. 77 figures, 29 tables. (DMC)

9603 (NYSERDA—83-18, pp 2.1-2.55) **Design of the biological/engineering experimental farm.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

In 1982 the principal emphasis for engineering work was modular raft design and analysis of rope culture systems. Previous research had confirmed that the best way to hold seaweeds in one place in the ocean is by culturing those which attach themselves to rope. Attempts to contain unattached seaweeds in mesh cages, for example, had little success. Research focused on farm designs based, in part, on Oriental systems. The simplicity of rope culture gives it many inherent advantages: Its openness provides sufficient sunlight and nutrient flow for good plant growth; diver access is furnished; slackness in the ropes allows the plants freedom of movement in the surrounding water, lessening plant damage from accelerated movement or interactions with the farm structure. 2 references, 24 figures, 12 tables.

9604 (NYSERDA—83-18, pp 3.1-3.12) **Bio-engineering and materials testing.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

Bio-engineering experiments are undertaken to yield insights for future design work by dimensioning properties of the plants and plant/structure system. Mechanical properties of the plants, required biofouling protection, necessary optical spectra and materials strength are all being investigated. We have begun determining plant strength and holdfast tensile strength in an acceleration flow-tank and in tow tests; exploring means of reducing water content of mature, harvestable Codium; and performing various materials tests. Results at present are preliminary. 7 references, 3 figures, 4 tables.

9605 (NYSERDA—83-18, pp 4.1-4.27) **Site selection.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

Field work was undertaken with several objectives: (1) to determine the environmental suitability of several sites for the experimental farm structure; (2) to obtain specific data needed for design of structures to be located there; and (3) to gain an understanding of seasonal variation in growth rates of marine biomass. Discussion is presented under the headings: temperature, salinity, stratification, light, nutrients, productivity, wind and wave observations, bottom sampling, and permits and permissions. Permits applications for 2 sites have been approved. The first site is near the LILCO Northport Facility and the second site is 1.6 km off Crone Neck on Long Island Sound.

9606 (NYSERDA—83-18, pp 5.1-5.24) **Field biological studies.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

The objectives of raft culture studies were to (1) monitor growth and performance of Laminaria saccharina, Codium fragile, Fucus vesiculosus, and Gracilaria tikvahiae as a function of seasonal environmental conditions; and (2) identify rapidly growing specimens for laboratory isolations of spores and/or gametes. Discussion is presented under the headings Laminaria saccharina; other species; natural bed studies; fouling and grazing; fouling process; prevention of fouling; observations of fouling on field experiments; and field sampling of fouling organisms. 2 references, 9 figures, 3 tables. (DMC)

9607 (NYSERDA—83-18, pp 6.1-6.34) **Greenhouse and laboratory experiments.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

Determination of year-round growth rates of Laminarian saccharina, Gracilaria tikvahiae, Agardhiella sublata (formerly species tenera), Codium fragile, and Fucus vesiculosus, in greenhouse cultures was the objective of this research. Major emphasis was again placed on Laminaria as this species continues to show the greatest promise for marine biomass. Light, nutrient, and temperature requirements of selected seaweeds were also studied. Discussion is presented under the headings: photosythesis in Fucus and Codium, ^{14}C uptake in relation to light and nitrogen; ^{14}C uptake in relation to season; nitrogen uptake in Fucus and Codium; minimizing the effects of seaweed bacteria on measurements of nitrogen uptake in Codium; analysis of ^{14}C experimental plants; and mannitol and Laminaria assays. 16 figures, 4 tables. (DMC)

9608 (NYSERDA—83-18, pp 7.1-7.21) **Seeding and harvesting marine biomass.** Oct 1983. Department of Communications, NYSERDA, Two Rockefeller Plaza, Albany, NY 12223.

In Marine biomass: New York State species and site studied. Annual report, December 1, 1981-November 30, 1982.

Research on controlling reproduction focused on determining nutritional requirements and growth rates of Laminaria saccharina gametophytes and sporophytes and of the different life phases of Gracilaria tikvahiae. It also included studies of spore seeding on different rope substrates and preparations for large-scale seeding on the experimental farm to be deployed in 1983. Biological harvesting experiments were performed on Laminaria saccharina laboratory cultured plants. Yields of C. fragile and G. tikvahiae were determined under conditions of nitrogen supplementation vs normal seawater conditions. 7 figures, 4 tables. (DMC)

9609 **(SERI/SP—612-965) Photovoltaic R & D program at SERI. An overview report.** Cotton, M.D. (Solar Energy Research Inst., Golden, CO (USA)). Jan 1981. Contract AC02-77CH00178. 29p. NTIS, PC A03/MF A01. Order Number DE84005380.

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Starting with its establishment in 1975 under ERDA, the history of the DOE photovoltaic program is briefly reviewed. The SERI photovoltaics research and development program is then described, including lead center activities, subcontracted research, technical support, and internal R & D. Topics of subcontracted research include advanced silicon work, including polycrystalline and amorphous materials, compound semiconductors such as cadmium sulfide and gallium arsenide, high efficiency concentrators, and innovative concepts. Technical support consists of measurement and evaluation, system analysis, performance criteria and standards, and insolation resource assessment. SERI internal research includes work in solid-state theory, high-efficiency cells, thin-film cells, silicon purification, silicon crystallization, thick-film technology, device processing, measurement research, and surface and interface analysis. (LEW)

9610 **(SERI/TP—211-2125) Thin-film photovoltaic research and development program of the Solar Energy Research Institute.** Sabisky, E.S. (Solar Energy Research Inst., Golden, CO (USA)). Oct 1983. Contract AC02-83CH10093. 22p. (CONF-8311131—1). NTIS, PC A02/MF A01. Order Number DE84000023.

From Physics and technical applications of amorphous materials meeting; Tokyo, Japan (15 Nov 1983).

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A review is given on the activities of the Solar Energy Research Institute (SERI) Thin-Film Photovoltaic Research and Development Program. SERI is one of three research centers responsible for implementation of the program objectives of the US National Photovoltaic Program, which is managed by the US Department of Energy's (DOE's) Photovoltaic Energy Technology Division. The primary research emphasized by SERI is the development of promising new approaches to photovoltaic cells such as thin-film and multi-junction concepts. The program plan and recent research and development results in the priority research areas are presented and discussed.

9611 **(SERI/TR—214-1743) R and D decision methods for photovoltaic program planning.** Jackson, B. (Solar Energy Research Inst., Golden, CO (USA)). Sep 1983. Contract AC02-77CH00178. 57p. NTIS, PC A04/MF A01. Order Number DE84000011.

This report contains a review of the basic methods available for R and D program management and considers their application within the advanced photovoltaic research program at the Solar Energy Research Institute (SERI). The review of basic R and D decision methods applies generally to R and D management. The analysis of the applicability of these methods in the advanced photovoltaic research program illustrates the potential of these management tools for other research programs.

9612 **(SERI/TR—9318-2-T1) Optimization of transparent electrode for solar cell and chemical vapor deposition of amorphous silicon. Final technical report, 15 September 1980-30 March 1983.** Gordon, R.G.; Proscia, J.; Ellis, F.; Kurtz, S. (Harvard Univ., Cambridge, MA (USA)). 1983. Contract AC02-77CH00178. 30p. NTIS, PC A03/MF A01. Order Number DE83017780.

A film of fluorine-doped tin oxide can meet all these requirements. A new process for depositing fluorine-doped tin oxide films was optimized. Further optimization of the transparent electrode films has been accomplished, with increasing substrate temperature being identified as a primary variable for obtaining better films. Deposition conditions for obtaining either smooth or rough films were identified, and the surface morphology was characterized by SEM photographs and by measurements of diffuse light scattering. Film growth rates were determined as a function of reactant concentrations. We developed a simple, sensitive and reliable method for measuring the interfacial or contact resistance between tin oxide and silicon. When this method was used to measure the contact resistance between highly conductive tin oxide films and highly doped silicon, values often exceeded 10 Ω-cm^2. Next, structures were tested, which incorporate a layer of highly doped, electrically conductive titanium oxide between the tin oxide and the silicon. These structures showed much lower contact resistances. Thermal degradation of these contacts was not found even at temperatures as high as 600°C. Amorphous silicon films were prepared by chemical vapor deposition. Electrical and optical properties were found to be similar to those of amorphous silicon produced by glow discharge. Hydrogen content of the films was typically 8 to 10%, and did not vary significantly with substrate temperature. The optical band gaps of the CVD material were slightly smaller than glow discharge a-Si of the same hydrogen content. Doping the CVD films during growth with boron or phosphorous produces conductivities on the order of 300 Ω-cm. Schottky diode cells with a structure stainless steel/n-Si/i-Si/Pt show an efficiency of about 3%, after correction for the transmission of the platinum layer.

9613 **(SLU-ISK—142) Study on cost of machine use in forestry. Proposing fuel consumption as cost determinant.** Sundberg, U. (Sveriges Lantbruksuniversitet, Garpenberg. Institutionen foer Skogsteknik). 1982. 98p. (In Egnlish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751400.

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The cost records of 1979 for 900 forest machines are analysed. It is suggested that the fuel consumption of a machine can be used as a cost determinant for its use (excl. operator). In 1979 the cost was 2.75 US dollars per liter diesel oil within a cost range of +- 20 per cent. The variation is largely due to differences in the capital costs depending on e.g. intensity of machine use and mode of manufacturing. For practical application a matrix is suggested incorporating such influences. Fuel consumption can be used as a parameter in optimizing labour/machine inputs, in planning and control of mechanized operations. It is suggested that the method - compared with standard costing procedures - gives equal accuracy, is more convenient and improves insight with regard to work and cost effectiveness.

9614 **(SLU-ISK—145) Fuelwood as a source of energy in private forestry - the situation in 1979 and future potential.** Sundin, T. (Sveriges Lantbruksuniversitet, Garpenberg. Institutionen foer Skogsteknik). 1982. 81p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751401.

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This investigation aims to increase the knowledge about the present use of energy for heating in private forestry and also to illustrate possible future use of fuelwood in private forestry. The population consists of 234,087 management units. 4,975 units were chosen and 3,854 of these are included in the investigation of energy consumption in private forest owners year-round residences. The results can be summarized as follows: - Fuelwood is an important basis for heating private forest owners year-round residences. Fuelwood is used by 66 per cent of the forest owners; 25 per cent have fuelwood as their only source of energy. - 45 per cent of the forest owner use oil; 20 per cent use only oil. - Electricity is part of the heating system in 30 per cent of the cases, 8 per cent use only electricity only. Forest owners who live on the farm use fuelwood more often than those who do not live on the farm. Forest owners who are very active in farming/forestry utilize fuelwood. - A total of 2,305,000 Cu m solid was used for heating owners year-round residences in 1979. Wood was the dominant source while fuelchips were used to a very small extent. - Total oil consumption was approximately 507,000 Cu m. - Total electricity consumption was approx. 862 GWh. - A total of 38.700 TJ was used for heating. Oil accounts for 46,7 per cent of this, fuelwood 45,3 per cent and electricity 8,0 per cent. This is equivalent to approx. 8 per cent of the total energy consumption for heating purposes in the country.

9615 **(SNV-PM—1657) Acidifying and basic effects of nitrogen fertilizers on forest soil.** Noemmik, H.; Wiklander, G. (Statens Naturvaardsverk, Solna (Sweden)). Mar 1983. 30p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751411.

Forest fertilization with ammonium nitrate probably causes a slight acidification of the soil. The extent of this acidification may vary, depending on the amount of nitrogen assimilated by the soil microflora and the vegetation, the proportions of ammonium and nitrate consumed in this process, and the nitrification capacity of the soil. A realistic estimate is that the toal acidification effect of a single ammonium nitrate dose corresponds to 40-60 kg CaO per hectare in increased liming requirement, i.e., 3-4 years-atmospheric acid deposition in central Sweden. Ammonium nitrate limestone, a mixture of ammonium nitrate and dolomite, has a basic effect, which largely balances the physiological acidity of the ammonium nitrate. The slow disolution rate of the dolomite, however, appears to reduce its possibilities to neutralize the rapid shifts in the soils acid/base status caused by ammonium nitrate. Nevertheless, in the long-run the content of dolomite/limestone may be of significance and should not be under-estimated. If the problem of nitrate leaching is disregarded, calcium nitrate offers a good alternative to ammonium nitrate limestone with regard to the basic effects. Its ability to neutralize acidity in greater profile depth may be of particular value. Urea should be regarded as a neutral N-fertilizer in non-nitrifying soils and has properties that make it fairly ideal from the viewpoints of soil and water conservation. Forest fertilization with nitrogen materials does not, in general, contribute to acidification of water systems.

9616 **Alcohol fuels from biomass.** Hira, A.U. (Mueller Associates, Inc., Baltimore, MD); Mulloney, J.A. Jr.; D'Alessio, G.J. *Environmental Science and Technology;* **17**: No. 5, 202A-213A(May 1983). Contract AC01-81EV10450.

An overview is presented of air, water, solid waste, and occupational safety and health problems that might arise at biomass-based ethanol and methanol production facilities. The major environmental concerns of biomass-to-ethanol plants are the effects of potential air emissions and wastewater effluents. Little data is available about the environmental characteristics of methanol plants because of the early stage of technological development. Initial surveys indicate that methanol emission and effluent streams may contain substances of greater environmental concern than do corresponding ethanol facilities. (JMT)

9617 **The growth and characterization of epitaxial solar cells on re-solidified metallurgical grade silicon.** D'Aiello, R.V.; Miller, E.A.; Robinson, P.H. (RCA Laboratories, Princeton, NJ 08540). *RCA Review;* **44**: No. 1, 30-47(Mar 1983).

This paper describes the results obtained at RCA Laboratories in the development of a solar-cell process based on using epitaxial thin films grown on a substrate made from low-cost metallurgical-grade (MG) silicon. The properties of the starting MG feedstock are described and related to the observed problem of SiC particle formation during ingot solidification. Data obtained on the size, spacial distribution in ingots, and the subsequent effect of particles on epitaxial solar-cell performance are presented. Methods for significantly reducing the SiC particle density were developed and are discussed along with the characteristics of solar cells made in particle-free material. The rotary-disc reactor used for epitaxial growth of solar-cell structures and its scale-up to large area and high throughput is described.

9618 **Electrochemical solar cells using CdSe thin film electrodes.** Xiao, Xu-Rui; Tien, H.Ti. (Department of Biophysics, Michigan State University, East Lansing, Michigan). *Journal of the Electrochemical Society;* **130**: No. 1, 55-59(Jan 1983). Contract FG02-80CS83101.

Electrochemical photocells consisting of a CdSe thin film anode and a Pt cathode immersed in 1M Na_2S-NaOH-S solution have been studied. CdSe thin films were formed on Ti, Cr, Mo, SnO_2, glassy carbon, and graphite substrates by coating an aqueous mixture of CdSe, $ZnCl_2$, and surfactant, subsequently sintering at 400°-500°C in air. The current-voltage (I-V) relations, output power efficiency, open-circuit voltage, and short-circuit current were measured. Seven percent power conversion efficiency was obtained at 20 mW/cm² light intensity after photoetching. The monochromatic I-V curves were analyzed.

9619 **Hydrogen storage and thermal load management in a solar energy conversion system.** Chang, R.R.; Bawa, M.S. (Texas Instruments, Inc., Dallas, TX). pp 228-232 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—). Contract FC01-79ER10000.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The Texas Instruments Solar Energy System is a closed loop process for the conversion of solar energy into electrical energy. The system comprises four essential components: arrays of silicon photovoltaic cells immersed in hydrobromic acid convert solar energy into chemical energy via electrolytic reactions producing bromine and hydrogen, bromine and hydrogen storage, a bromine-hydrogen fuel cell, and a heat pump for recovery and upgrading of low-grade thermal energy. This paper discusses the hydrogen storage component and thermal load management of the Texas Instruments Solar Energy Conversion System.

9620 **Thermal energy recovery concepts for texas instruments solar energy system.** Chang, R.R.; Bawa, M.S. (Texas Instruments, Inc., Dallas, TX). pp 233-239 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—). Contract FC01-79ER10000.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Texas Instruments Solar Energy System design requires the development of several subsystems which control the power conversion efficiency of the solar chemical convertor (SCC) arrays. A cooling device which allows the recovery of thermal energy is economically advantageous, because it can moderate rise in temperature and prevent loss in efficiency of the silicon photo-cells. This paper discusses the concepts for cooling of the SCC arrays. Relative merits of cooling by water spray or sheet, by phase change salts and thermo-electrics, and by forced air or water heat exchangers are explored. Physical configurations and qualitative/quantitative comparisons show the superiority of water-based cooling. Water-based subsystem maximizes the thermal recovery and also provides a more direct link with the thermal requirements of hydrogen storage and domestic hot water heater. SCC array cooling requires dissipation of 100-300 W/m² of thermal energy. The thermal requirements of hydrogen storage and domestic hot water heater are adequately met by recovery and upgrading of thermal energy from SCC arrays.

9621 **PV concentrator array installed costs.** (Sandia National Laboratory, Albuquerque, NM). pp 222-227 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Photovoltaic concentrator array installed costs per adjusted peak watt (W /SUB ap/) have been developed for three leading tracking structure designs using current and expected concentrator module performance. Total installed costs are presented for the arrays for 10^8m²/yr production and 500 kW /SUB p/ field sizes. Array field annual performance and cost per W /SUB ap/ are developed as a function of array spacing using the results of a detailed computer performance code which includes the effects of array shading, series/parallel wiring, by-pass diode, maximum power tracking, and PCU voltage limitations. Results indicate installed costs of the three arrays are within 10 percent of each other. Installed costs are relatively insensitive to array spacing and are approximately $4/W /SUB ap/ with current technology and can be expected to drop to $3 to $3.50/ W /SUB ap/ with near-term array cost reductions and cell efficiency improvements.

9622 **Production of nonconventional crops for methane feedstocks.** Gilreath, J.P.; Pitman, W.D.; Rockwood, D.L. pp 340-350 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Research was initiated to assess the potential of selected woody trees, weeds and saw-palmetto (Serenoa repens) for biomass production in Florida. Forty tree species were outplanted at seven sites. Propagation and growth performance are discussed. Whole plants of saw-palmetto provided dry mass yields of 24.6 to 34.6 mt/ha, while shoots alone yielded 1.2 to 7 mt/ha. Carbohydrate content of plant storage organs decreased from winter through fall and showed distinct effects of harvest on plant energy reserves. Response of castorbean (Ricinus communis), dogfennel (Eupatorium capillifolium), sida (Sida rhombifolia), pigweed (Amaranthus hybridus) and saltbush (Baccharis sp.) to low levels of nitrogen (N) and potassium (K) fertilizer was studied. Saltbush (8.4 mt/ha) did not respond to fertilizer. Addition of N resulted in the highest yields of dry matter for castorbean (10.8 mt/ha), sida (42.8 mt/ha), pigweed (16 mt/ha) and dogfennel (in excess of 43 mt/ha).

9623 **Interfacial chemistry at p-GaP photoelectrodes.** Ginley, D.S.; Chamberlain, M.B. (Sandia National Laboratories, Albuquerque, NM). *Journal of the Electrochemical Society;* **129**: No. 9, 2141-2144(Sep 1982).

P-GaP photoelectrodes are of interest as cathodes in photosynthetic photoelectrochemical devices. The nature of the surface appears crucial to the efficient utilization of this material. In this study we show how an oxide surface layer is present even in the reductive environment at the surface; that this layer appears to be necessary for efficient interfacial charge transport; and that high solution oxygen concentrations increase the stability of this layer and consequently the electrode. Aging experiments with chemical and surface analyses are included that support these surprising results.

9624 **Microanalysis of candidate thin & thick film photovoltaic materials.** Russell, P.E.; Herrington, C.R. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1051-1056(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Thin and thick films of materials such as CdTe, InP, Zn_3P_2, GaAs and $CuInSe_2$ represent candidate materials for low cost photovoltaic applications. The films typically exhibit a high degree of surface roughness when prepared by potentially low cost techniques. WDS and EDS analysis on an automated electron microprobe has been developed for compositional analysis of candidate films. The use of a defocused beam and low beam voltage greatly reduces the error caused by sample roughness when using standard ZAF analysis routines. Taking data from a large number of points, performing individual ZAF analysis and then averaging the results gives additional improvements in quantitative analysis. Errors due to surface roughness can easily be reduced to a few atomic percent. Examples of errors introduced in ZAF fundamental parameters are discussed. These include errors due to round-off of atomic weights and uncertainties in mass absorption coefficients. EDS analysis, with proper background stripping and peak deconvolution, is found to be comparable in accuracy to WDS.

9625 **Progress in the SERI-DOE photoelectrochemical cell program.** Wallace, W. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1066-1071(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The concept of photoelectrochemical storage has been investigated and demonstrated in studies involving three electrode in situ and four electrode redox storage cells. For these cells system efficiencies of 1-3 % have been obtained to date for the net conversion of light energy into electrical energy. SERI also monitors the technical progress in the Texas Instruments Solar Energy System program which involves conversion of light energy into electrical and thermal energy in a system which incorporates electrochemical storage. Progress in the Texas Instruments program is reviewed for FY 82. Research on polycrystalline thin film n-CdSe and n-CdSe / SUB x/ Te /SUB 1-x/ based electrochemical photovoltaic cells has resulted in the achievement of efficiencies up to 7 % for the direct conversion of light energy into electrical energy without storage in devices containing a sulfide/ polysulfide electrolyte. Higher efficiencies are possible with improved polycrystalline thin films and alternate electrolytes.

9626 **Amorphous silicon materials and solar cells: progress and directions.** Sabisky, E.S.; Mahan, H.; McMahon, T. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1106-1110(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

In 1978, the U.S. Department of Energy initiated government sponsored research in amorphous materials and thin film solar cells. The program was subsequently transferred to the Solar Energy Research Institute for program management. The program grew into a major program for the development of high efficiency (greater than 10%), cost effective (15-40 cents per peak watt) thin film amorphous solar cells. The present international interest, the substantial progress made in the device area (2% PIN cell in 1976 to 10% PIN cell in 1982), and the marketing of the first consumer products using thin film solar cells are to a large extent a consequence of this goal-oriented program.

9627 **Disilane versus monosilane: a comparison of the properties of glow-discharge a-Si:H Films and solar cells.** Delahoy, A.E.; Corderman, R.R.; Griffith, R.W.; Kampas, F.J.; Vanier, P.E. (Chronar Corp., Princeton, NJ). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1117-1123(Sep 1982). (CONF-820906—). Contract AC02-76CH00016.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The consequences of using disilane instead of silane for the glow-discharge deposition of a-Si:H solar cells have been studied. Deposition rates were increased fivefold by the use of disilane. The a-Si:H films have a higher hydrogen content, but otherwise are quite similar to silane produced films and possess the same type of gap states. Chlorosilanes, HCl, and oxysilanes were detected in the disilane by mass spectrometry and their influence on film and solar cell properties assessed. The problem of inadvertent dopant tails resulting from the higher deposition rate of the solar cells is identified.

9628 **A 10% efficient ITO-CdTe heterojunction solar cell.** Werthen, J.G.; Anthony, T.C.; Bube, R.H.; Fahrenbruch, A.L. (Department of Materials Science and Engineering, Stanford University, Stanford, California). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1138-1142(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

ITO/CdTe heterojunctions have been formed by electron beam evaporation of indium-tin-oxide (ITO) onto single crystal / rho/-type CdTe and onto close-spaced-vapor-transport (CSVT) CdTe films deposited on single crystal /rho/-type CdTe. Solar efficiencies of 10.5% referred to active area V /SUB oc/ = 0.81 V, J /SUB sc/ = 20 mA/cm^2) have been realized with junctions on single crystal CdTe. These heterojunctions have been stable for 10 months. The exploratory ITO//rho/-CdTe(CSVT)//rho/-CdTe(single crystal) heterojunctions show V /SUB oc/ = 0.46 V, J /SUB sc/ = 20.0 mA/cm^2 and a solar efficiency of 5.5%.

9629 **Directional solidification of silicon in carbon crucibles by an oscillating crucible technique.** Daud, T.; Dumas, K.A.; Kim, K.M.; Schwuttke, G.H.; Smetana, P. (Jet Propulsion Laboratory, California Inst. of Technology, Pasadena, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 63-67(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Casting of silicon ingots is of importance to the terrestrial photovoltaic industry because of its potential low cost. However, the quality of silicon cast by present techniques is limited by the presence of dislocations and grain boundaries in unseeded growth and by cellular structures with dislocation networks in the case of the seeded growth. To address these concerns, a new method of directional solidification called the Oscillating Crucible Technique (OCT) is developed. During growth, a carbon crucible is oscillated to provide for effective stirring of the melt. This growth technique (seeded growth only), along with material characterization and solar-cell fabrication and testing, is described. Solar-cell efficiencies of up to 13% at 100 mW/cm^2 are obtained in the single crystalline areas. Minority-carrier diffusion lengths exceeding 100 μm are measured even in the polycrystalline areas of the wafers. Limitations of the present setup and possible future improvements are discussed.

9630 **Interaction between cast silicon properties and solar cell performance.** Hyland, S.; Engelbrecht, J.A.A.; Iles, P.; Schwuttke, G. (Jet Propulsion Laboratory, Pasadena, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 68-73(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Three types of cast silicon, Silso (Wacker), HEM (Heat-Exchanger Method - Crystal Systems) and UCP (Ubiquitous Crystallization Process-Semix) were studied for their use as solar cells. Optical microscopy after etching revealed a high density of uniform dislocations (approaching 10^4/cm^2), lines of dislocations indicating stress during crystal growth, and precipitates, some of which generate dislocations. Solar cells were fabricated by three processes. Results of solar cell processing revealed that these materials produce cells of lower efficiency than Czochralski control cells, and that the efficiencies of the three materials were quite close. Diffusion length and spectral response data are shown. Certain structural features are correlated with solar cell efficiency, diffusion length, and spectral response. Electron-beam induced current (EBIC) and light spot scanning are used to back up other measurements.

9631 Progress in growth of silicon ribbon by a low angle, high rate process. Jewett, D.N.; Bates, H.E.; Locher, J.W. (Energy Materials Corporation, So. Lancaster, MA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 86-89(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Substantial progress has been achieved in the development of the Low Angle Silicon Sheet (LASS) crystal growth technique since its inception in mid 1979. Continuously grown ribbons of 10 to 30 meters are produced routinely at growth rates of 10 to 80cm/min. Ribbon widths are 4 to 15cm and thickness varies from 0.3 to 0.6mm with 0.5mm typical. At an average growth speed of 30cm/min and a width of 15cm, productivity of 450cm²/min of ribbon has been demonstrated. Solar cells made from LASS material have exhibited up to 12.9% conversion efficiency (AMI) on 4 x 4cm boron doped blanks.

9632 Flat-plate solar array progress and plans. Callaghan, W.T. (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 115-118(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The Flat-plate Solar Array Project (FSA) is sponsored by the U.S. Department of Energy and is managed by the Jet Propulsion Laboratory, California Institute of Technology. Considerable technical progress has been achieved by FSA since that reported in a paper delivered at the 15th IEEE Specialists Conference at Orlando, Florida. The basic technological direction has also changed since the last report. Technical progress in the areas of silicon feedstock refinement; large-area sheet formation; flat-plate module process sequence development, and engineering and environmental testing are discussed, in the context of a revised thrust developed by the US Department of Energy. The new thrust of FSA is directed toward higher-risk, longer-term-payoff work that emphasizes the assumption of those technological risks that industrial firms are not likely to finance in the effort to develop reliable, low-cost photovoltaic modules.

9633 Research on polycrystalline silicon solar cells: goals and accomplishments. Milstein, J.B.; Hardy, R.W.; Tsuo, Y.S. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 119-122(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper reviews the results obtained in the polycrystalline silicon solar cell task area at the Solar Energy Research Institute (SERI) since the last IEEE Photovoltaic Specialists Conference, and presents a description of the goals which are expected to be achieved in the next year and beyond. Some of the future program elements are presented in general terms, in view of Requests for Proposals that are presently in process.

9634 Silicon electrorefining using a semipermeable Cu_3Si:Si anode. Olson, J.M.; Carleton, K.; Kibbler, A. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 123-127(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The authors have recently developed a silicon permeable anode material that significantly enhances the effectiveness of a molten salt silicon electrorefining process and permits the low temperature fabrication of "silicon" anode plates, a prerequisite for the operation of an efficient, multiplate electrorefining process. Using metallurgical grade silicon (mgSi) as a feedstock, this hybrid process has yielded 99.9996+% pure silicon in a stable, poly- or single-crystalline form and is particularly effective at removing boron, phosphorous, aluminum, and iron.

9635 Development and evaluation of the Texas instruments solar energy system. McKee, W.R.; Carson, K.R.; Levine, J.D. (Texas Instruments Incorporated, Dallas, TX). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 257-262(Sep 1982). (CONF-820906—). Contract FC01-79ER10000.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The Texas Instruments Solar Energy System (TISES) is a unique solar energy conversion and storage system with many potential cost advantages over other approaches now being considered. The individual photovoltaic elements are tiny silicon spheres which are packed into thin glass sheets and then immersed in an HBr electrolyte where they perform an electrolysis function. The system provides for storage of the reaction products and then recombination in a fuel cell to produce an electrical output. The development status of the various system components will be presented. Plans for outdoor testing of a complete, functional prototype unit will also be discussed.

9636 Guidelines and methodology for design and analysis of advanced PV technology systems. Lambarski, T.J.; DeBlasio, R.; Irby, C.A.; Mrig, L.; Semmens, M.G. (The Bom Corporation, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 289-294(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

If advanced PV technologies are to be integrated into practical, cost-effective applications, the development objectives for the technologies must include other objectives beyond cell efficiency. Cells must be capable of being integrated into efficient, cost-effective modules. Certain characteristics, such as high cell voltage, are easily seen to be desirable. In order to identify other desirable characteristics, a methodology for design and analysis of advanced PV technology systems has been developed. It is based on constraints necessary for modules and systems in practical applications. The methodology was exercised on selected advanced PV technologies. Conclusions and guidelines were developed for these technologies as well as for advanced PV technology development in general. This paper presents the technologies chosen for conceptual design development, the methodology used, results of the system design and analysis, and conclusions and guidelines based on the results. Additional details can be found in reference 1.

9637 High efficiency silicon solar cells. Weaver, H.T.; Nasby, R.D. (Sandia National Laboratories, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 361-365(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A summary of data on high-performance silicon solar cells is presented. Cells are discussed which represent state-of-the-art single crystal silicon devices and which exhibit power conversion efficiencies above 20 percent at concentration. One group of p^+ -n cells exhibited open-circuit voltages (V /SUB oc/) as high as 0.653 V at one sun insolation. This large V /SUB oc/ suggests that bandgap narrowing effects are smaller than has been assumed in the past for this type cell.

9638 Characterization of the electrical output of flat-plate photovoltaic arrays. Gonzalez, C.C.; Hill, G.M.; Ross, R.G. (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 384-390(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The electric output of flat-plate photovoltaic arrays changes constantly, due primarily to changes in cell temperature and irradiance level. As a result, array loads such as direct-current to alternating-current power conditioners must be able to accommodate widely varying input levels while maintaining operation at or near

the array maximum power point. The results of an extensive computer simulation study that was used to define the parameters necessary for the systematic design of array/power-conditioner interfaces are presented as normalized ratios of power-conditioner parameters to array parameters, to make the results universally applicable to a wide variety of system sizes, sites, and operating modes. The advantages of maximum power tracking and a technique for computing average annual power-conditioner efficiency are discussed.

9639 **Impurities in polycrystalline silicon solar cells.** (Westinghouse R and D Center, Pittsburgh, PA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 411-416(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The effects of grain boundaries and impurities on silicon solar cell performance have been studied in single-crystal and polycrystalline ingots by intentionally incorporating 2 x 10^{12} cm^{-3} molybdenum, 10^{14} cm^{-3} titanium, and about 10^{15} cm^{-3} chromium during Czochralski growth. Mo, Ti, and Cr degrade solar cell performance by inducing deep levels in silicon. Electrically active grain boundaries also reduce cell performance by inducing carrier recombination in the bulk as well as in the depletion region of the solar cell. At low impurity concentrations, polycrystalline cell performance is controlled by grain-boundary recombination, while at high concentrations, it is dominated by the impurity, resulting in equal efficiencies for single-crystal and polycrystalline cells. Impurity-grain-boundary interactions are species dependent and result in a decrease in impurity-induced deep-level concentration: Cr exhibits the largest interaction, Ti a weak interaction, and Mo no measureable effect.

9640 **Studies of grain boundaries in small-grained polycrystalline silicon solar cells.** Young, R.T.; Narayan, J.; Van Der Leeden, G.A.; Wood, R.F. (Solid State Division, Oak Ridge National Laboratory, Oak Ridge, TN). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 427-430(Sep 1982). (CONF-820906—). Contract W-7405-ENG-26.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Progress in the development of small-grained (10-100 μm) polycrystalline Si solar cells is hampered by the present poor knowledge of physical and chemical properties of grain boundaries and the lack of satisfactory processing techniques for junction formation. In the work discussed in this paper the authors have studied grain boundaries and their effects in polycrystalline silicon with grain sizes of 1-2 mm and in smaller grained material with grain sizes of 10 μm and 40-50 μm. Results for various recombination effects observed in the large-grained material are described and the influence of lithium passivation on the electrical properties of the small-grained material and on the characteristics of solar cells made from it are reported.

9641 **Some advanced testing techniques for concentrator photovoltaic cells and lenses.** Wiczer, J.J.; Chaffin, R.J.; Hibray, R.E. (Sandia National Laboratories, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 448-453(Sep 1982). (CONF-820906—). Contract AC04-76DP00789.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The authors describe two separate test techniques for evaluating concentrator photovoltaic components. For convenient characterization of concentrator solar cells, they have developed a method for measuring the entire illuminated I-V curve of a photovoltaic cell with a single flash of intense simulated sunlight. This method reduces the heat input to the cell and the time required to test a cell, thus making possible quick indoor measurements of photovoltaic conversion efficiency at concentrated illumination levels without the use of elaborate cell mounting fixtures or heat sink attachments. The other test method provides a technique to analyze the spatially dependent, spectral distribution of intense sunlight collected and focused by lenses designed for use in photovoltaic concentrator systems. This information is important in the design of multijunction photovoltaic receivers, secondary concentrators, and in optimizing the performance of conventional silicon cell concentrator systems.

9642 **Manufacturing cost analysis of 1980 vintage photovoltaic arrays.** Chan, T.S.; Hodge, R.C. (General Electric Company, King of Prussia, PA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 459-462(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Within DOE the Photovoltaic Concentrator Technology Project has a technology readiness milestone of substantiating a factory array price of $2.80/peak watt in a 1980 timeframe. For this timeframe the three most promising concentrator PV approaches are linear focus Fresnel and trough and a point focus Fresnel. Using actual module test data to project annual energy collection potential and detailed manufacturing and installation cost estimates $/annualized peak watt projections of $3.50 to $4.78/watt have been projected. This paper summarizes the work performed to arrive at these cost projections.

9643 **The effect of operating-point-control strategy on the annual energy production of degraded photovoltaic arrays.** Branz, H.M. (Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, MA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 525-531(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A new computer simulation of the annual operation of degraded flat-plate photovoltaic (PV) arrays is used to evaluate the need for maximum-power-point tracking in real PV systems. The simulations are based on single-glitch I-V curve shapes rather than particular array degradations, making the data reported applicable to any system whose likely failure modes are predictable and result in single-glitch I-V curves. The simulations show that with a reasonable array wiring strategy, effective maintenance, periodic I-V curve tracing, and avoidance of frequent and serious array shadowing, there is no reason that considerations of degradation should force the adoption of maximum-power-point-tracking power conditioning on a PV system that would otherwise operate economically at fixed voltage.

9644 **The measurement of variations in minority carrier lifetime due to microstructural defects in large area polysilicon wafers.** Johnson, S.M.; Culik, J.S. (Solarex Corporation, Rockville, MD). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 548-553(Sep 1982). (CONF-820906—). Contract FC01-80ET23197.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper describes the measurement and analysis of minority carrier lifetime inhomogeneities in large area polysilicon wafers used to fabricate solar cells. Variations in free carrier lifetime are measured using a contactless microwave technique. The use of a subsequent Secco etch enables structurally related minority carrier lifetime degradation mechanisms to be distinguished from impurity related lifetime decreases.

9645 **Enhanced diffusion of phosphorus at grain boundaries.** Cheng, L.J.; Crotty, G.T.; Daud, T.; Stika, K.M. (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 554-558(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Enhanced diffusion of phosphorus at grain boundaries in cast polycrystalline photovoltaic materials (Wacker, HEM, and Semix) was studied. It was found that the enhancements for the three materials were the same, indicating that the properties of boundaries

are similar, even though they were grown by different techniques. In addition, it was observed that grain boundaries capable of enhancing the diffusion always have strong recombination activities. Both phenomena could be related to dangling bonds existing at the boundaries. The present study gives the first evidence that incoherent second order twins are diffusion-active.

9646 **The V-Groove silicon solar cell.** Borden, P.G.; Nasby, R.D.; Walsh, R. (Varian Associates). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 574-577(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The V-Groove silicon solar cell is designed to achieve high efficiency at high concentration. It uses a v-groove front surface to obtain minimal grid shadowing losses, while allowing high fractional grid coverage. The serrated structure and front surface refraction minimizes the photon penetration depth, reducing the required diffusion length and allowing use of epitaxial layers on highly doped substrates. This minimizes base resistance. Cells have achieved 17.4% AM1 efficiency at 200 suns, 24°C, with 25% front grid coverage.

9647 **Superlattice cascade solar cell.** Wanlass, M.W.; Blakeslee, A.E. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 584-589(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper reports progress toward realization of a new cascade solar cell structure whose chief advantages over other present concepts are: use of silicon for the substrate and low bandgap cell; avoidance of the necessity of lattice matching; and incorporation of a GaAs/GaP superlattice to enhance efficiency and provide a low-resistance connecting junction. Details of the design and operation of an OMCVD system for growing this structure are presented. Results of experiments to optimize layer thickness, compositional uniformity, and surface morphology are described.

9648 **Sandia concentrator array testing experiences.** Gerwin, H.J.; Beavis, L.; Rogers, C. (Sandia National Laboratories). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1252-1255(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

An assortment of PV concentrator modules and arrays have been tested and evaluated at the Sandia outdoor test facility. These test items include actively-cooled parabolic reflector and linear Fresnel lens concentrators, and actively and passively cooled point focus collectors. Maximum power efficiencies were measured over a range of sunlight intensities and cell temperatures, then a linear equation relating efficiency to cell temperature and insolation was developed for each module and array by using a multiple linear regression analysis technique on the data. An evaluation of the suitability of Polyvinyl-Butyral (PVB) as a material used to laminate solar cells to glass is presented. Some general observations are made on the accuracy of tracking systems, and the maintenance of these systems.

9649 **Design solutions for the solar cell interconnect fatigue fracture problem.** Mon, G.R.; Ross, R.G. (Jet Propulsion Laboratory, Californian Institute of Technology). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1268-1276(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Mechanical fatigue of solar cell interconnects is a major failure mechanism in photovoltaic arrays. The authors recently published a comprehensive approach to the reliability design of interconnects together with extensive design data for the fatigue properties of copper interconnects. This paper extends the previous work, developing failure prediction (fatigue) data for additional interconnect material choices, including aluminum and a variety of copper-Invar and copper-steel claddings. An improved global fatigue function is used to model the probability-of-failure statistics of each material as a function of level and number of cycles of applied strain. Life-cycle economic analyses are used to evaluate the relative merits of each material choice. The copper-Invar clad composites demonstrate superior performance over pure copper. Aluminum results are disappointing.

9650 **Junction characteristics of indium tin oxide/indium phosphide solar cells.** Sheldon, P.; Ahrenkiel, R.K.; Hayes, R.E.; Kazemrski, L.L.; Nottenburg, R.; Russell, P.E. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1284-1287(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Efficient indium tin oxide (ITO)/p-InP solar cells have been fabricated. Typical uncorrected efficiencies range from 9-12% at AM1 intensities. It is shown that deposition of ITO causes a semi-insulating layer at the InP surface as determined by C-V measurements. The thickness of this layer is approximately 750 A. The authors believe that this high resistivity region is due to surface accumulation of Fe at the ITO/InP interface.

9651 **Applications of electrogenerated conducting polymers in electrochemical photovoltaic cells.** Noufi, R. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1293-1298(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Results are presented which show that electro-chemically generated conducting polypyrrole films protect n-type semiconductor photoelectrodes from degradation while permitting electron exchange between the semiconductor and the electrolyte. The performance characteristics and stability of such film-covered photoelectrodes are discussed.

9652 **Diffusion length and collection width for the evaluation of a-Si.** McMahon, T.J.; Konenkamp, R. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1389-1393(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Using the liquid Schottky contact, the surface photovoltage technique is applied to a variety of glow discharge a-Si:H films to measure collection width, diffusion length and depletion width. These measures are also seen to be a sensitive method for studying light-soak changes. Finally, estimates of the density of states at the Fermi level have been made.

9653 **Attainment of 10% conversion efficiency in amorphous silicon solar cells.** Catalano, A.; D'Aiello, R.V.; Dresner, J.; Faughnan, B.; Firester, A.; Kane, J.; Schade, H.; Schwartz, G.; Smith, Z.E.; Triano, A. (RCA Laboratories, Princeton, NJ). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1421-1422(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

In this paper the authors report attainment of conversion efficiencies of over 10% in single junction devices for the first time. This result has been obtained through loss minimization, which has included the use of a wide band gap p-layer comprised of an amorphous silicon carbon alloy. An analysis of conventional a-SiH / SUB x/ devices indicates that the principal loss mechanisms within the device are: absorption within the p-layer; limited photon absorption/minority collection in the i-layer; absorption in the transparent conducting oxide; and reflection losses at the conducting oxide/a-Si:H and glass/air interfaces. The light losses within the a-Si:H device have been minimized through the use of a wide band

gap silicon carbide p-layer, combined with a relatively long diffusion length i-layer and incorporate a reflecting back contact to achieve a record device efficiency of 10.1%. Reaching this goal meets one of the most important criterion for the application of these devices for utility scale photovoltaic power plants.

9654 Advances in semicrystalline silicon solar cells. Putney, Z.; Storti, G.; Wrigley, C. (Semix Incorporated, Gaithersburg, MD). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1463-1464(Sep 1982). (CONF-820906—). Contract FC01-80ET23197.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Major new achievements have been attained in semicrystalline solar cell performance as a result of advances in the UCP (Ubiquitous Crystallization Process) technology and SPLIT (Simultaneously Present Large Impurty Technology) silicon reduction and purification processes. Pilot manufacturing of semicrystalline solar cells from semiconductor grade silicon with the UCP technology has achieved a mean of AM1 efficiency exceeding 15%. Combining SPLIT silicon with the UCP technology (completely bypassing the expensive Siemens refinement process), has resulted in achieving solar cell efficiency as high as 14%. These new advances confirm the viability of this approach to low-cost photovoltaics.

9655 Improved beam processing for terrestrial solar cells. Young, R.T.; Levatter, J.I.; Sandstrom, R.L.; Van Derleeden, G.A.; Westbrook, R.D. (Helionetics, Inc., and Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1468-1469(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The major difficulties at present in using laser beam processing for terrestrial solar cells are lack of a suitable laser for large volume cell production expense and low throughput of conventional ion implantation, especially for the low energy (5-10 keV), high dose ($5x10^{15}cm^{-2}$) implantation needed to obtain shallow p-n junctions. In this paper, the authors demonstrate that these problems may be solved by using simple glow discharge implantation equipment and an XeCl excimer laser for annealing. Preliminary results indicate that with this combination, p^+n Si solar cell with efficiencies of 15% AM1 can be readily obtained without any back surface field.

9656 Ultrathin GaAs and AlGaAs solar cells. Boettcher, R.J.; Borden, P.G.; Ludowise, M.J. (Varian Associates Inc., Palo Alto, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1470-1473(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Techniques for making 3 to 10 micron thick AlGaAs and GaAs solar cells by stop etching are described. The method is to grow a normal structure with a 90% AlGaAs layer buried below the base. The emitter contact is formed and the cell bonded to a cover glass; the substrate is then etched away. The process and test results are given. Also described is a back surface reflector (BSR) for such a cell.

9657 Empirical testing of structural deflection modeling of large photovoltaic modules. Duncan, L.B.; Cuddihy, E.F.; Garcia, A.; Minning, C.P. (Hughes Aircraft Company, El Segundo, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1256-1261(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The objective of the structural deflection test was to verify the analytical models used to predict solar cell stress, loadbearing layer stress, and module deflection that result from a uniform pressure load on the module surface. The verification process consisted of measuring module deflection, stress in the solar cell, and stress in the load-bearing member as a function of normal pressure load, pottant modulus of elasticity, pottant thickness, and cell location. Four glass superstrate modules, two plain wood substrate modules, two ribbed wood substrate modules, and a steel substrate module were tested. Consistent with analysis predictions, all unribbed specimens exhibited non-linear load vs. deflection characteristics. With the exception of the steel module, test results and analysis predictions for panel deflections agreed to within 10 percent. A wider variation of agreement was found for stress in the load-bearing members and cells.

9658 Designing cost accounting models for biomass energy systems and direct applications of geothermal energy. Barron, W.; Perlack, R. (Oak Ridge National Lab., TN). pp 701-703 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

1406 Photovoltaic Power Systems

REFER ALSO TO CITATION(S) 9638, 9947

9659 (DOE/R4/10165—T1) Solar-powered postage stamp: an artist's energy statement. Plank, D. (Plank (Don), St. Petersburg, FL (USA)). 26 May 1980. Contract FG44-80R410165. 8p. NTIS, PC A02/MF A01. Order Number DE84000751.

Portions are illegible in microfiche products.

The project reported was to construct a photovoltaic solar power demonstration, consisting of two solar cell panels, a charge controller, battery pack, electric eye, and output meters in plain view of the public. Project finances are also reported. (LEW)

9660 Comparison of evolving photovoltaic and nuclear power systems for Earth orbital applications. Rockey, D.E.; Jones, R.M.; Schulman, I. (Jet Propulsion Laboratory, Pasadena, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 1: 70-76(Aug 1983). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

As the Space Shuttle becomes fully operational, NASA and DOD missions may require high power Earth orbital power systems. Total end-to-end comparisons are made for representative photovoltaic and nuclear systems. The photovoltaic systems examined range from flight demonstrated conventional solid substrate solar array/NiCd battery approaches to undemonstrated advanced array/energy storage systems. End-of-life power to mass performance is presented for 25 kW photovoltaic arrays at orbital altitudes ranging from low Earth orbit to geosynchronous orbit for 1, 5, and 10 year missions. The SP-100 nuclear power system is examined for three technology levels ranging from near term to advanced approaches for 25 and 100 kWe power levels. The system specific power, or ratio of load power to power system mass, for each end-to-end photovoltaic and nuclear system is presented. Detailed descriptions of various photovoltaic and nuclear power systems together with their associated electrical block diagrams are also presented.

9661 The DOE photovoltaics program: an overview. Ferber, R.R. (Jet Propulsion Laboratory, Pasadena, CA). pp 212-217 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The objective of the United States Department of Energy Photovoltaic Energy Technology Program is to focus federal support on research and development to advance the scientific understanding and enlarge the technology base needed for the private sector to develop and utilize advanced photovoltaic (PV) energy systems in the United States. This objective is being accomplished by a combined federal and industry coordinated effort to develop the technology and to perform sufficient experimental systems tests to insure that high quality, low cost and long life products can be

available to the energy marketplace within this decade. A PV Program overview is presented in this paper that includes the major elements of the U.S. photovoltaics research, development, and applications activities. Research and technology development activities are summarized for flat-plate arrays, concentrator arrays, and balance-of-system components. Key application experiment projects are briefly described. These include remote and stand-alone, residential, intermediate load center, and central station experiments now in operation or under development.

9662 **Future contingencies and photovoltaic system worth.** Jones, G.J.; Bonk, G.J.; Thomas, M.G. (Sandia National Laboratories, Albuquerque, New Mexico). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 955-960(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The value of dispersed photovoltaic systems connected to the utility grid has been calculated using the General Electric Optimized Generation Planning program. The 1986-2001 time period was used for this study. Photovoltaic systems were dynamically integrated, up to 5% total capacity, into 9 NERC based regions under a range of future fuel and economic contingencies. Value was determined by the change in revenue requirements due to the photovoltaic additions. Displacement of high cost fuel was paramount to value, while capacity displacement was highly variable and dependent upon regional fuel mix.

9663 **Reporting of operational results from intermediate-sized photovoltaic systems.** Rogers, C.S.; Baxter, H.M.; Harrison, T.D.; Pruett, H.D. (Sandia National Laboratories, Albuquerque, New Mexico). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 988-992(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

The performances of 12 intermediate-sized photovoltaic power systems are being evaluated by Sandia National Laboratories as part of the National Photovoltaic Program. The data collection system and the monthly summary reports issued for each system are described. Typical data plots for an example system are presented.

9664 **Empirical testing of an analytical model predicting electrical isolation of photovoltaic models.** Garcia, A.; Cuddihy, E.F.; Minning, C.P. (Spectrolab Inc., Sylmar, CA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1014-1019(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A major design requirement for photovoltaic modules is that the encapsulation system be capable of withstanding large DC potentials without electrical breakdown. Presented herein is a simple analytical model which can be used to estimate material thickness to meet this requirement for a candidate encapsulation system or to predict the breakdown voltage of an existing module design. A series of electrical tests to verify the model are described in detail. The results of these verification tests confirmed the utility of the analytical model for preliminary design of photovoltaic modules.

9665 **Reliability, availability and maintenance-costs models for use in the design of photovoltaic power systems.** Stember, L.H. (Battelle Columbus Laboratories, Columbus, Ohio). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1036-1040(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Two techniques were developed for modeling the availability and maintenance costs of photovoltaic power systems. Their use permits the incorporation of reliability and maintenance cost considerations during design. The paper describes the technical approach, the techniques developed, the input data required, and the output information generated by the techniques. Flowcharts and example inputs and outputs are provided to illustrate the techniques' capabilities.

9666 **An advanced photovoltaic system simulator to demonstrate the performance of advanced photovoltaic cells and devices.** Mrig, L.; DeBlasio, R.; O'Sullivan, G.A.; Tomko, R.P. (Solar Energy Research Institute, Golden, CO). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 199-204(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper describes a photovoltaic system simulator for characterizing and evaluating the performance of advanced photovoltaic cells, modules, and arrays as well as for simulating the operation of advanced conceptual photovoltaic systems. The system simulator is capable of extrapolating the performance from a single laboratory cell, or of a module to power levels up to 10 kw. The major subsystems comprising the system simulator are Solar Array Simulator, Power Conditioning Unit, Load Controller and Resistive Load Unit, Data Acquisition and Control Unit, and Cell Test Bed. The system was designed and fabricated by Abacus Controls, Inc., Somerville, NJ, under subcontract to SERI, and has recently been installed (except the cell test bed) at SERI, where initial operation is taking place.

9667 **Design and construction of a hybrid photovoltaic (3KW /SUB p/) -thermal solar energy system for a residential/commercial building.** Loferski, J.J.; Beall, J.; Case, C.; Dobbins, R.; Doodlescack, G.; Krikorian, J.; Roessler, B.; Russell, T. (Brown University, Division of Engineering, Providence, RI). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 188-193(Sep 1982). (CONF-820906—). Contract AC03-79CS30205.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper describes the planning, design and construction of a flat plate hybrid photovoltaic/ thermal (PV/T) system with an electric heat pump intended for on-site generation of heat and electricity for a dwelling or commercial building. The building, which has been erected on the campus of Brown University, is of a unique prefabricated design; the dimensions are 30' x 40' plus a 300 ft^2 gallery. The twenty PV/T collectors have 3' x 6' absorber surfaces and incorporate approximately 3000 four inch diameter silicon cells bonded to glass with a high-temperature-tolerant, uv-degredation-resistant silicone bonding cement. Extensive computer modelling of the system has shown that about 65% of the total annual energy needs (heating, cooling, hot water, distributed electric load) will be provided by the PV/T system. Half of this energy will be electrical; half, thermal. Coupling with the utility is through a synchronous inverter. The system can store thermal energy for space heating in a rock bin storage box. Results of an economic analysis are also included.

9668 **Photovoltaic energy systems: a project perspective.** Kern, E.C. (Massachusets Institute of Technology, Cambridge, MA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 246-252(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

During the past six years, the Massachusetts Institute of Technology Lincoln Laboratory (MIT LL) has designed and built photovoltaic energy systems for widely varying load applications, in sizes ranging from a hundred to a hundred thousand watts and in locations ranging from Mount Washington, New Hampshire, to Molokai, Hawaii. On the basis of this experience--ranging from application study through conceptual and detail design, to fabrication, installation, operation and evaluation--a perspective on photovoltaic energy systems as a potentially significant contributor to the nation's electric power requirements is presented.

9669 Residential photovoltaic systems: results and issues. Jones, G.J.; Biringer, K.L. (Sandia National Laboratory, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 253-256(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

If the photovoltaic system in a residential application is viewed as dedicated to the household loads, the on-site energy use becomes the key factor in system design. However, the basis for this viewpoint is that the backup electricity cost to the homeowner is independent of the PV system's presence. This assumption appears invalid if the utility's perception of distributed energy generators is analyzed. If a PV system is to reflect long term utility action, then the value of PV generated energy must be based on utility avoided cost independent of the point of final energy use. In this paper the authors discuss this perspective and show how it leads to a realization that residential system designs are independent of on-site load and direct use fraction.

9670 Retrofit photovoltaic systems for intermediate sized applications-A design and market study. Noel, G.T.; Hagely, J.R. (Battelle's Columbus Laboratories, Columbus, Ohio). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 263-269(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

An assessment of the technical and economic feasibility of retrofitting a significant portion of the existing intermediate sector building/application inventory with photovoltaic systems is presented. The assessment includes the development of detailed engineering and architectural designs as well as cost estimates for 12 representative installations. Promising applications include retail stores, warehouses, office buildings, religious buildings, shopping centers, education buildings, hospitals, and industrial sites. A market study indicates that there is a national inventory of 1.5 to 2.0 million feasible intermediate sector applications, with the majority being in the 20 to 400 kW size range. The present cost of the major systems components and the cost of necessary building modifications are the primary current barriers to the realization of a large retrofit photovoltaic system market. The development of standardized modular system designs and installation techniques are feasible ways to minimize costs.

9671 Detailed conceptual designs and economic analyses of a reference photovoltaic central power station. Hughes, O.J.; Heller, B.W.; Stephenson, J.E. (Martin Marietta Denver Aerospace Solar Energy Systems). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 276-280(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Detailed conceptual designs and economic analyses of a reference 100MWe Photovoltaic Central Power Station (PV CPS) have been completed. Both flat plate dendritic WEB and point focus fresnel concentrator (100X concentration) arrays were used to develop two individual central station reference designs. Design requirements, detailed drawings and system, subsystem and component specifications form the basis for a plant construction cost estimate. The flat plate array PV CPS costs range from $179M to $483M (1982 U.S. Dollars) for array costs ranging from $1/Wp to $3.50/Wp and power conditioning unit (PCU) costs from $.05/Wp to $.50/Wp. Similar costs for the concentrator PV CPS range from $201M to $505M, respectively. Using representative utility financial parameters, in-house economic models, and a plant performance estimate, levelized busbar energy costs (BBEC) are derived for both flat plate and concentrator designs. BBEC range from $.15/kWh to $.41/kWh for the flat plate PV CPS from .15/kWh to $.37/kWh for the concentrator PV CPS.

9672 Residential photovoltaic system simulation: electrical aspects. Hart, G.W. (Massachusetts Institute of Technology, Cambridge, MA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 281-288(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A computer program has been developed to simulate the performance of utility-interactive residential photovoltaic energy systems. The simulation was designed with the goal that it be sufficiently detailed to allow the comparison and evaluation of various system design options, such as fixed voltage operation versus maximum-powerpoint tracking. In order to calibrate, test and evaluate the simulation, it is compared with actual measured data obtained at MIT Energy Laboratory's Northeast Residential Experiment Station (NE RES). By comparing this measured data with previous simulations, it is seen that certain calculations have resulted in discrepancies of up to 50% in calculating the final energy quantities-the energy purchased and sold to the utility. The simulation presented reduces the error to less than 5%.

9673 Low-cost modular array-field designs for flat-panel and concentrator photovoltaic systems. Post, H.N.; Alexander, G.; Carmichael, D.C.; Castle, J.A. (Sandia National Laboratories, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 378-383(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

This paper describes the design and development of low-cost, modular array fields for flatpanel and concentrator photovoltaic (PV) systems. The objective of the work was to reduce substantially the cost of the array-field balance-of-system (BOS) subsystems and site-specific design costs as compared to previous PV installations. These subsystems include site preparation, foundations, support structures, electrical wiring, grounding, lightning protection, electromagnetic interference considerations, and controls. To reduce these BOS and design costs, standardized modular (building-block) designs for flat-panel and concentrator array fields have been developed that are fully integrated and optimized for lowest life-cycle costs. Using drawings and specifications now available, these building-block designs can be used in multiples to install various size array fields. The developed designs are immediately applicable and reduce the array-field BOS costs to a small fraction of previous costs. Prototype array fields are currently being installed using each of the two alternative building-block designs developed for flat-panel PV array fields.

9674 Utility interface issues for grid-connected photovoltaic systems. Chu, D.; Fitzer, J.; Key, T. (Sandia National Laboratories, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 391-395(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Photovoltaic (PV) balance-of-system research and development has focused on interconnection with the utility grid as the most promising future application for photovoltaic energy production. These systems must be compatible with the existing utility grid to be accepted. Compatibility encompasses many technical, economic and institutional issues from lineman safety to revenue metering and power quality. This paper reviews DOE/PV sponsored research for two of the technical interconnection issues: harmonic injection, and power factor control. Explanations and rationale behind these two issues will be reviewed, and the status of current research and plans for required future work will be presented.

9675 Cost analyses of modular flat-panel and concentrator photovoltaic array fields. Carmichael, D.C. (Battelle's Columbus Laboratories, Columbus, Ohio). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1176-1182(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

In order to reduce the array-field balance-of-system (BOS) costs and the engineering design costs, modular designs, optimized for minimum life-cycle energy cost, have been developed for flat-panel and concentrator photovoltaic installations. Application ex-

periments and other photovoltaic (PV) systems recently installed had shown that these cost elements had to be substantially reduced before PV power systems could be cost-effective for grid-connected applications, regardless of the cost of the PV cells/modules. The characteristics of the modular array-field designs developed are described in another paper at this conference. This paper describes the costs estimated and the life-cycle energy cost analyses performed for the developed modular designs. In example analyses of these designs, the array-field BOS costs contribute only 0.9 to 1.2 cents per kWh to the levelized energy cost of generated electricity.

9676 **Design and installation experiences from nine intermediate-sized photovoltaic systems: A critical analysis.** Burgess, E.L.; Biringer, K.L. (Sandia National Laboratories, Albuquerque, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1189-1197(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Nine intermediate-sized photovoltaic system experiments have been constructed under the direction of Sandia National Laboratories as part of the U.S. Department of Energy National Photovoltaic Program. The purpose of these application-oriented experiments is to provide experience in the design, construction, and operation of full-scale, on-site photovoltaic systems. This paper summarizes the vast experience gained during the design and installation phases of the projects and analyzes this experience with respect to its implications on future designs.

9677 **Review of PV module performance at DOE/MIT Lincoln Laboratory test sites during the period 1977-1982.** Forman, S.E.; Themelis, M.P. (Massachusetts Institute of Technology, Lincoln Laboratory, Lexington, Massachusetts 02173). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1198-1207(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

During the years 1977-1982, MIT Lincoln Laboratory (LL) placed over 11,000 photovoltaic (PV) modules at experimental PV power generating systems in a number of field test sites in the United States. Prominent among these are a 100-kW system at Natural Bridges National Monument in Utah, a 25-kWp system at Mead, Nebraska, and a 15-kW system at Bryan, Ohio. The modules used in each of these systems were procured through the Jet Propulsion Laboratory's Large Scale Procurement Program as part of the U. S. Department of Energy's National Photovoltaic Program. Through a program of periodic surveillance, measurements, and inspections at the aforementioned sites, electrically failed modules were located, removed and analyzed during this six year period. The principal causes of failure were: cells cracked due to weathering or internal module stresses, failed solder joints, interconnects not soldered to rear sides of cells at assembly, cells or interconnects electrically shorted to metallic substrates, and broken or split interconnects. Details and photographs of many of the different types of failures are presented and some of the analysis techniques used to locate the failures are described.

9678 **Prototype residential Photovoltaic systems: Evaluation results.** Nicols, B.E.; Russell, M.C. (MIT Lincoln Laboratory, Lexington, MA). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1344-1349(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Since 1979 Massachusetts Institute of Technology Lincoln Laboratory has been developing and testing residential-size photovoltaic power systems for the U.S. Department of Energy. Lessons learned from this experience, and performance summaries for the five prototype systems at the Northeast Residential Experiment Station (in Concord, Massachusetts) and the system at the all-electric Carlisle PV house, are given. Results of evaluating five utility-interactive residential-size inverters also are reported.

9679 **Progress at the southwest residential experiment station.** Schafer, J.F.; Lieberman, M.A. (New Mexico Solar Energy Institute, Las Cruces, NM). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1355-1361(Sep 1982). (CONF-820906—). Contract AC04-82AL20090.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Results are presented from the continuing performance evaluation of eight prototype residential photovoltaic systems at the Southwest Residential Experiment Station (SW RES) in Las Cruces, New Mexico. Additionally, data from the authors' occupied residence monitoring program in Las Cruces and an overview of present and planned activity at the SW RES are included. An extensive summary of lessons learned through the first 18 months of SW RES operation is provided.

9680 **Design and economics of a photovoltaic concentrator array for off-grid applications.** Maish, A.B.; Rios, M. (Sandia National Laboratories). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1362-1367(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A second generation stand-alone 680 W /SUB p/ photovoltaic (PV) concentrating array for low-power, non-grid connected applications has been designed and costed at Sandia National Laboratories. The array consists of six passively-cooled point-focus Fresnel lens concentrating modules on a two-axis polar mount tracking structure. The new array design incorporates several major improvements to the first generation design which was built and tested at Sandia National Laboratories. These include 50% more array area and a control system which allows unattended, fully-automatic operation. This paper discusses the array design and expected performance. Using a range of estimated production costs for small production volumes, the life-cycle energy costs have been calculated and compared to the equivalent energy costs of a 3 kW diesel electric generator set and an equivalent flat panel PV system.

9681 **Residential photovoltaic power conditioning technology for grid connected applications.** Key, T.S.; Klein, J.W. (Sandia National Laboratories, Albuquerque, New Mexico). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 1456-1458(Sep 1982). (CONF-820906—).

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

Several major advances in the area of power conditioning for residential application were made during the last 12 months. This paper summarizes the current status of the technology and reviews potential for future performance and cost improvement. The power conditioners of interest are single-phase, grid-connected in the 2-10 kW size range. The work described has been accomplished by private industry as well as within the DOE photovoltaic (PV) power conditioner development program.

1407 Solar Thermal Power Systems

REFER ALSO TO CITATION(S) 9667

9682 **(CONF-8304133—) SSPS Central Receiver System (CRS) midterm workshop.** Becker, M. (ed.). (Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.); Sandia National Labs., Livermore, CA (USA)). Jun 1983. Contract AC04-76DP00789. 768p. NTIS MF A01. Order Number DE84001819.

From SSPS Central Receiver System (CRS) midterm workshop; Tabernas, Spain (19 Apr 1983).

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The purpose of this Workshop on the Central Receiver System was to compare the design intentions with the first year results and to draw conclusions from the experiences made. The Workshop is divided into three sessions. Session 1 addresses the

whole CRS system and its operation. Sessions 2 and 3 concentrate on the subsystems which have solar-specific components: at Session 2, the Heliostat Field System (HFS) is discussed; Session 3 reviews the Sodium Heat Transfer System (SHTS). These two sessions have been organized so that the design, results, and experiences of the HFS and SHTS can be examined thoroughly. The general discussion following each session allow the most important facts and findings to be summarized. Separate abstracts were prepared for the individual papers presented at each session.

9683 (DOE/DP/00789—T27) Thermal losses of the sodium storage vessels of the Central Receiver System. IEA Small Solar Power Systems Project technical report No. 7/83. Jacobs, H. (International Test and Evaluation Team, Almeria (Spain)). Nov 1983. Contract AC04-76DP00789. 36p. NTIS MF A01. Order Number DE84004479.

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In solar thermal power stations, the knowledge about the plant efficiency has a very high priority. The thermal losses of the heat transfer system are needed as one input value for calculating this efficienty and for developing the loss stair step diagram. The thermal losses of both sodium tanks of the SSPS Central Receiver System (CRS) in Tabernas (Spain) are determined using two different methods. The values are calculated using the well known laws of heat transfer. The results are verified by observing the cooling down behavior under different conditions such as sodium level in the tanks and status of the electrical trace heating. The result of the calculations are summarized into characteristic heat transfer values, which are independent of the temperatures and the sodium level in the tanks. To make these values more transparent, the losses are expressed in kW for different conditions. Other figures show the temperature inside the tank during nighttime. Investigation of the sodium system by looking at the consumption of electrical energy of the trace heating is to be accomplished in the near future.

9684 (DOE/ET/20255—T2-Vol.1) Crosbyton Solar Power Project, Phase I. Volume I. Main text. (Texas Tech Univ., Lubbock (USA); E-Systems, Inc., Dallas, TX (USA)). 18 Feb 1977. Contract AC04-76ET20255. 238p. NTIS, PC A11/MF A01. Order Number DE84002707.

The Crosbyton Solar Power Project consists of an investigation of the merits of the FMDF (Fixed Mirror, Distributed Focus) or Solar Gridiron Concept for production of electricity in the context of the environment and electrical demand of the City of Crosbyton, Texas. The organization of this report is designed to feature the nominal system and to document the development of the capability for analysis and optimization of such systems. A general description of the FMDF Concept is given in Section I. In Section II, the Crosbyton site is described in detail in order to lay out the constraints of relevance as a yardstick for the nominal design; in Section III, an overall description of the nominal system is presented. The next six sections discuss various specific aspects of the system nominated. Sections X and XI summarize the expected performance and costs of the nominal system, and Section XII assesses the overall financial aspect of such systems. Section XIII gives response to the quick look conducted by the earlier chapters by identifying those areas in which there is likelihood that initial engineering judgement can be improved. This section probes what has been learned and leads to the overall assessment of Section XIV. The appendices document various details vital to the results of the main text and to the achievement of downstream deliverables. These are treated separately.

9685 (DOE/ET/20255—T2-Vol.2) Crosbyton Solar Power Project, Phase I. Volume II. Appendices A-H. (Texas Tech Univ., Lubbock (USA); E-Systems, Inc., Dallas, TX (USA)). 18 Feb 1977. Contract AC04-76ET20255. 357p. NTIS, PC A16/MF A01. Order Number DE84002708.

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Volume II, (Appendices A-H), includes the following: (A) monthly statistics of the Crosbyton load; (B) boring logs for soil analysis at Crosbyton site; (C) optical analysis; (D) optical analysis by E-Systems; (E) development of the receiver thermal-fluid model; (F) E-Systems overall receiver thermal analysis; (G) receiver thermal stress analysis and material; and (H) overall collector analysis.

9686 (DOE/ET/20255—T2-Vol.3) Crosbyton Solar Power Project, Phase I. Volume III. Appendices I-M. (Texas Tech Univ., Lubbock (USA); E-Systems, Inc., Dallas, TX (USA)). 18 Feb 1977. Contract AC04-76ET20255. 347p. NTIS, PC A15/MF A01. Order Number DE84002709.

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Volume III, (Apendices I-M), includes the following: (I) concentrator analysis; (J) receiver analysis; (K) control and system management; (L) systems analysis and simulation; and (M) panel development and mirror reflectivity.

9687 (DOE/ET/20255—T2-Vol.4) Crosbyton Solar Power Project, Phase I. Volume IV. Main text. (Texas Tech Univ., Lubbock (USA); E-Systems, Inc., Dallas, TX (USA); Foster Wheeler Energy Corp., Houston, TX (USA)). Feb 1978. Contract AC04-76ET20255. 84p. NTIS, PC A05/MF A01. Order Number DE84002710.

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In this report the work performed in Segment I of Phase I of the Crosbyton Solar Power Project (CSPP) is described. The central organizing theme of the CSPP is the continuing development of an FMDF solar thermal electric power system through the Nominal Power System (NPS) and Recommended Power System (RPS) stages to the Selected Power System (SPS) for construction at Crosbyton. The work of Segment I, Part B shown consists of conceptual design of an RPS, continuation of the research program, design specification of the Analog Test System (ATS), and design of a plan for incorporating the ATS into the research program.

9688 (DOE/ET/20255—T2-Vol.5) Crosbyton Solar Power Project, Phase I. Volume V. Appendices A-L. (Texas Tech Univ., Lubbock (USA); E-Systems, Inc., Dallas, TX (USA); Foster Wheeler Energy Corp., Houston, TX (USA)). Feb 1978. Contract AC04-76ET20255. 542p. NTIS, PC A23/MF A01. Order Number DE84002711.

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This volume gives the research support for Phase I of the project. Each appendix specifically discusses the relationship of the Analog Test System (ATS) to the Recommended Power System (SPS) and to the research programs. Included are the following appendices: (A) optical-thermal-fluid analyses and experiments; (B) receiver subsystem; (C) system management-control and tracking subsystems; (D) mirror surfaces and mirror panels; (E) concentrator support structure; (F) survivability, maintenance and safety; (G) assessment of energy storage strategies and options; (H) investigation of power cycle, electrical production, and distribution options; (I) analysis of site dependent factors; (J) system and economic modeling and simulation; (K) instrumentation and data processing for the analog test system; and (L) FMDF concentrator/receiver wind tunnel test results.

9689 (SAND—82-8048) International Workshop on the Design, Construction, and Operation of Solar Central-Receiver Projects. (Sandia National Labs., Livermore, CA (USA)). May 1983. Contract AC04-76DP00789. 221p. (CONF-8210194—). NTIS, PC A10/MF A01. Order Number DE84000626.

From International workshop on the design, construction, and operation of solar central receiver projects; Claremont, CA, USA (19 Oct 1982).

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The International Workshop on the Design, Construction, and Operation of Solar Central Receiver Projects was convened in Claremont, California, from October 19 to October 22, 1982. Representatives from the six major international projects - Themis (France), Sunshine (Japan), IEA/SSPS (Spain), Eurelios (Italy), CESA-1 (Spain), and the Barstow Pilot Plant (USA) - exchanged information on their respective central receiver plants. This document contains the papers presented at the Workshop, as well as summaries of the four group sessions and the final panel discussion. Topics for the four group sessions are: (1) design and construction; (2) staffing for operation and maintenance; (3) maintenance and reli-

ability; and (4) evaluation of project results and exchange of information. The final panel discussion dealt with ways to improve exchange of information on solar central receiver systems. Individual abstracts are prepared for the papers.

9690 **Crack tip oxidation of a superalloy in molten nitrate salt.** Goods, S.H. (Sandia National Laboratories, Livermore, CA 94550). *Scripta Metallurgica;* **17**: No. 4, 533-536(Apr 1983). Contract AC04-76DP00789.

Alloy 800 has been proposed for use in the receiver tube panel arrays of advanced solar central receiver (SCR) designs. In this application the alloy will be exposed to a molten mixture of sodium and potassium nitrate salts at temperatures ranging up to approximately 600°C While these salts are routinely used in a variety of applications including metal heat treating and process heat transfer, common industrial experience has been limited to maximum temperatures of 400°C - 450°C. There is, therefore, considerable interest in the compatibility of these salts with containment alloys at the higher temperatures associated with SCR designs. Additionally, the containment alloy may be subject to thermally induced fatigue damage resulting from intermittent cloud cover and diurnal cycling. Previous work has found that slower near-threshold fatigue crack growth rates (FCGR) in Alloy 800 result when it is tested in molten nitrate salt at 600°C (relative to air). This reduction in FCGR was attributed to an environmentally induced increase in oxidation resulting in oxide-induced crack closure. The purpose of the present work was to examine the influence of a typical nitrate salt composition on crack tip oxidation in Alloy 800 in order to determine if in fact the proposed corrosion phenomena could explain the fatigue crack growth characteristics of the alloy.

1408 Ocean Energy Systems

REFER ALSO TO CITATION(S) 9761

9691 **Vapor/droplet coupling and the mist flow (OTEC) cycle.** Lee, C.K.B.; Ridgway, S.L. (R & D Associates, Marina del Rey, CA 90291). *Journal of Solar Energy Engineering;* **105**: No. 2, 181-186(May 1983). Contract AC03-76ET28400.

The present experiments have demonstrated that water droplets (about 200-μ dia) can be lifted to substantial heights (about 50 m) by their own vapor produced in flashing over temperature differences typical of the tropical seas. The coupling between the vapor and droplets is found to be excellent. The efficiency for momentum coupling is over 90 percent, and that for energy coupling is shown to vary inversely with the slip ratio. For the conditions in the present experiments, it varies from 50 to 80 percent. The momentum transfer is correlated with an interaction parameter which is the product of the liquid fraction, the slip, and the amount of flashing. For the high vapor flow cases, the pressure difference across the lift column is found to be proportional to the interaction parameter. The relevance of the two-phase flow to a class of open-cycle ocean thermal energy conversion (OTEC) schemes is considered, and the implications of the observed strong vapor/droplet coupling to the feasibility of the mist-flow OTEC cycle are discussed.

9692 **Hydraulic air compression for ocean thermal energy conversion applications.** Chen, F.C.; Golshani, A. (Oak Ridge National Lab., TN). pp 382-384 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—). Contract W-7405-ENG-26.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

1409 Solar Thermal Utilization

REFER ALSO TO CITATION(S) 9541, 9548, 9549, 10044, 10163, 10168, 10169

9693 **(BFR-R—26-1983) Solar heating by heat pump as a complement to an oil-heated plant in Gothenburg.** Buresten, R.; Gunnarsson, I. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1983. 65p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751408.

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The report describes a solar heating plant as a complement to an oil-heated district heating centre in Gothenburg, dimensioned for the preparation of hot-water during the season when oil heating is off, 15th May to 15th September. The plant is also intended to deliver basic energy in providing hot-water in other periods of the year. To reach the requirements to extracting solar energy with heat pump in this context the technical conditions and terms are as follows. The surface of a solar collector must be 200 m^2. The collectors are mainly directed to the south and the angle of inclination is 10°, which is in line with the existing roofs and esthetically accepted. The collected solar energy will be accumulated in a well insulated tank of water of 20 m^3 useful volume. The accumulator has to cope with storing a short time, i.e. to contain full-loaded energy for some twenty-four hours use. In using heat pump with condenser effect of appr. 70 kW one may utilize low thermal levels for heat water preparation with the simulation program TRNSYS where the flow of energy, the course of temperature and running times have been studied.

9694 **(BFR-R—28-1983) Solar heated public outdoor swimming pools.** Matsson, L-O. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1983. 71p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751407.

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Public outdoor swimming pools warmed up with solar heating technique have been studied in Sweden. The solar radiation has also been studied during a period. The measurement indicates that a simple unglazed solar collector gives the best economy when used only in summertime. When the solar heating system is used longer, the single glazed and insulated solar collectors will give a good economy when the system works as specified. It has been found that the solar heat has demonstrated its usefulness concerning the outdoor swimming pools, but the costs are high and something must be done to reduce them.

9695 **(BNL—51603) Solar energy and heat pumps: evaluation of combined systems for heating and cooling of buildings.** Andrews, J.W.; Catan, M.A.; Le Doux, P. (Brookhaven National Lab., Upton, NY (USA)). Sep 1982. Contract AC02-76CH00016. 152p. NTIS, PC A08/MF A01. Order Number DE84003880.

An analysis of a broad range of solar assisted heat pump systems was carried out. Systems were divided into three categories on the basis of whether ground coupling was included in the system and, if so, whether solar energy was stored in the ground or used in some other way. In the category of non-ground-coupled systems, an advanced air-source heat pump concept designed to improve capacity and coefficient of performance at low source temperatures was used as the basis for a dual source heat pump. For ground coupled systems which do not store solar heat in the ground, three options were considered: use of simple passive techniques to reduce the effective heating load; use of photovoltaics to drive the heat pump compressor; and use of active solar components as a source to the heat pump, for direct space heating, or for domestic hot water only. For systems which do store solar energy in the ground, the minimum size for efficient thermal carryover from summer to winter was determined to be a system capable of serving $\sim$ 100 houses. Use of a fuel-fired heat pump is also an advantage in these larger systems. Economic analyses were based on a maximum allowable payback of 8 years for residential systems. For the large-scale system, a simplified 10-year life-cycle costing was employed.

9696 **(CONF-831016—2) Measured performance of a solar augmented heat pump/chiller system with thermal storage in tanks of stratified water.** Wildin, M.W. (New Mexico Univ., Albuquerque (USA). Dept. of Mechanical Engineering). 1983. Contract W-7405-ENG-26. 18p. NTIS, PC A02/MF A01. Order Number DE84001949.

From Symposium on solar energy; Palma de Mallorca, Spain (2 Oct 1983).

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The performance of the heating and cooling system in a building designed to illustrate energy conservation, solar energy use and thermal storage for electric load management and energy conservation was monitored for a period of 20 months, beginning in January 1981. Solar energy was employed to augment the heating energy obtained by heat recovery using electric-driven reciprocating heat pump/chillers and an air-to-air heat exchanger. Solar energy was gathered by 289 m^2 (3110 ft^2) of evacuated tube collectors on the roof of the building, which has a gross floor area of 5330 m^2 (57,350 ft^2). The fractions of the total active heating load, including air-to-air heat recovery, supplied by solar energy for the one partial and one completed heating season for which results were obtained, were 50 and 42 percent, respectively. Stratified water tanks were used in the heating season to store excess solar energy and both heating and cooling capacity generated by the heat pump/chillers. During the cooling season, the tanks were used to store cooling capacity generated by the chillers. An economic analysis using the results for energy consumption obtained from this building indicated that the solar system was not economically attractive, despite its encouraging technical performance. Thermal storage for electric load management was attractive for moderate costs of capital.

9697 **(DOE/AL/12548—T1) Georgia Power Corporate Headquarters solar system. Final construction status report.** (Heery Energy Consultants, Inc., Atlanta, GA (USA)). 15 Dec 1983. Contract AC04-81AL12548. 30p. NTIS, PC A03/MF A01. Order Number DE84003496.

The 24-story high-rise and the three story low-rise consumes about 50,000 Btu/ft^2-yr (including computer process loads). The solar system will provide about 18.6% of the heating and cooling loads. There are 23,712 square feet of parabolic trough collectors which collect a maximum of 3.4 million Btu/hr. Past experience and advice from previous DOE projects lead to the use of a treated water recirculation freeze protection system in lieu of an ethylene glycol system. The project uses a unique version of the Delavan tracker in order to perform properly in the southeastern climate. Conclusions reached during this project include: (1) even with performance type specifications, detailed specifications for intergration into building mechanical systems are required, (2) reaction time of the computer control system can inhibit the collector tracking system operation, (3) extreme care must be used in a large system design to insure balanced flow, (4) the Delavan tracker can be altered to operate more efficiently, (5) the GPC solar system is providing slightly less than the predicted amount of energy, due to apparently higher than expected parasitic losses, (6) total available direct radiation appears to be less than predicted for summer months, (7) the electrical hardware at the collector motors requires more maintenance than expected because of the harsh environment at their locations, (8) the control logic has to be altered to deal with hot hazy days, and (9) there are a number of improvements needed to make the system more maintenance free.

9698 **(DOE/CE/30742—15) Passive solar commercial buildings project. Project status report, November 1-December 31, 1983.** (ESG, Inc., Atlanta, GA (USA)). 1983. Contract AC02-82CE30742. 45p. NTIS, PC A03. Order Number DE84005337.

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Additional work on the Security State BLAST input file has resulted in better agreement between measured and estimated conditions. Although agreement is not complete, additional sources of error have been identified and some original problems corrected. A third visit has been made to the Security State Bank and data on the modified building operation obtained. The planned continuous infiltration test using equipment supplied by Lawrence Berkeley Laboratories was cancelled. It was found that the complexity of the test was beyond the scope of this project. The data acquisition system installed by ESG in the Security State Bank has been turned over to representatives of Architectural Energy Corporation (AEC) for long term data retrieval. Further monitoring of this site by ESG is not expected. A data acquisition system has been installed in the Salt Lake City Johnson Controls building. The necessary one time measurements were made on the building. Hourly data from the building is to be provided to ESG by AEC over telecommunication lines. No data has been made available yet from this site. The final data from the building modifications is not expected before the end of January, 1984.

9699 **(DOE/CH/10101—T3) DOE/MASEC energy research house, Olathe, Kansas. Final report.** (National Association of Home Builders of the United States, Washington, DC. Research Foundation). Oct 1983. Contract AC02-82CH10101. 48p. NTIS, PC A03/MF A01. Order Number DE84004548.

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The design of the house includes large areas of south facing glass and hard surfaced concrete floors for passive solar heating. The house also incorporates oversized active solar collectors to provide domestic hot water and to contribute to space heating in conjunction with an innovative water-to-water heat pump radiant slab heating system, which also provides summer cooling. In addition, a water-to-air heat pump was used to provide supplementary heating and cooling, primarily to the upper level of the house. Provision for limited monitoring included some 40 temperature sensing thermocouples throughout the house, the surrounding environment and the lake which serves as the heat source/sink for the heat pumps. Separate watt-hour meters were also installed for all major appliances and equipment to allocate energy use. Periodic readings of temperatures and energy use were made starting in December 1982 through August 1983. Measurements were also made to determine the coefficient of performance of the heat pumps under winter and summer operating conditions. The demonstration house has been used as a model home and office since completion. Performance under normal occupied conditions would likely vary.

9700 **(DOE/CS/31590—T4) Development of a high temperature solar powered water chiller. Phase III. Technical progress report, October 1, 1979-July 31, 1981.** English, R.A. (Carrier Corp., Syracuse, NY (USA). Energy Systems Div.). Feb 1982. Contract AC03-77CS31590. 85p. NTIS, PC A05/MF A01. Order Number DE84005159.

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This project is to design, construct and test a 25 ton air-cooled solar water chiller for multi-family and commercial applications. The design utilizes a dual loop Rankine power cycle driving a Rankine vapor compressor cycle. R-113, selected as optimum for this application, is common to both loops. The prime mover is a high speed turbo machine with gas bearings and a variable speed electric auxiliary energy source. During this period, the turbo machine was completed and successfully bench tested on an air loop to qualify the rotor dynamic design. The chiller, with turbo machine, was completed in a water cooled configuration to facilitate initial testing. The chiller was installed in a specially designed test loop with complete instrumentation and data acquisition equipment. A series of tests was initiated to qualify the turbo machine rotor dynamics and gas bearings in the R-113 working fluid under selected operating conditions. During these tests, a failure of the thrust bearing was experienced. A detailed analysis of this failure is presented in this report with recommendations for future work.

9701 **(DOE/R6/10968—T1) Solar wood drying kiln.** Bangert, T. (Bangert (Thomas), Eureka Springs, AR (USA)). 31 Sep 1980. Contract FG46-79R610968. 37p. NTIS, PC A03/MF A01. Order Number DE84003435.

Design and experiences involved in building the solar kiln are presented. The collection of information and sharing of information with others is discussed. The kiln consisted of a lean-to greenhouse structure attached to a building containing stacked green wood. Fans are used to circulate heated air through the wood. (MHR)

9702 **(DOE/R6/12018—T1) North-side solar greenhouse. Final report.** Witt, C.K. (Witt (Charles K.), Las Cruces, NM (USA)). [nd]. Contract FG46-80R612018. 17p. NTIS, PC A02/MF A01. Order Number DE84000213.

The design, construction, and operation of a greenhouse attached to the north side of a house are described. It is claimed that a greenhouse on the north can be more efficient when evaluated on a year-round basis, than a southside solar greenhouse.

9703 **(DOE/SF/11573—T1-Vol.2) Active Program Research Requirements (APRR). Volume II, Appendix A. Cost Catalog. Final report.** (JRB Associates, Inc., McLean, VA (USA); Science Applications, Inc., McLean, VA (USA)). 31 Oct 1983. Contract AC03-81SF11573. 195p. NTIS, PC A09/MF A01. Order Number DE84002142.

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The purpose of this catalog is to provide cost information on active solar energy system components that will assist in establishing the Active Program Research Requirements (APRR). In particular the catalog is intended to: specify the components used to build the base case (current and future) active systems for each development scenario in terms of representative specifications and performance characteristics; and provide the estimated cost of components and installation work on a unit cost basis in 1981/82 dollars. In addition, the catalog provides for the following: documentation of component material and thermodynamic characteristics; standardization of costs for components common to several active systems; provision of a basis for modifying system costs uniformly and on a component/subsystem basis in response to projected improvements; and listing of references for component characteristics and costs.

9704 **(NBS-BSS—147) Performance criteria for solar heating and cooling systems in residential buildings.** (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Sep 1982. 239p. NTIS, PC A11/MF A01. Order Number DE84900502.

This performance criteria, developed for the Department of Housing and Urban Development, is a baseline document for criteria and standards for the design, development, technical evaluation, and procurement of solar heating and cooling systems for residential buildings in accordance with the requirements of Section 8 of Public Law 93-409, the Solar Heating and Cooling Demonstration Act of 1974. The document is intended to establish minimum levels of performance with regard to health and safety and the various aspects of technical performance. The criteria for health and safety put primary emphasis on compliance with existing codes and standards. The criteria on thermal and mechanical performance, durability/reliability and operation/servicing present performance requirements considered to be representative of acceptable levels. By the use of performance language in the document, it is believed that sufficient latitude has been provided to allow the innovation and flexibility that is essential for the stimulation of a viable solar industry at this time and in the future.

9705 **(SERI/SP—722-1296) Specification/cost data base: residential retrofit.** (Solar Energy Research Inst., Golden, CO (USA)). Mar 1982. Contract AC02-77CH00178. 98p. NTIS, PC A05/MF A01. Order Number DE84003589.

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This manual contains technical specifications for 17 residential variations of renewable resource retrofit systems and cost estimates for each of these systems for 56 cities. Costs are provided for each system on a resident-installed and contractor-installed basis. The systems are arranged as follows: active solar systems, passive solar systems, and wind energy conversion systems.

9706 **(SLU-LBT—30) Internal solar collectors for greenhouses.** Andreason, I. (Sveriges Lantbruksuniversitet, Lund. Inst. foer Lantbrukets Byggnadsteknik). 1983. 103p. (In Swedish, English). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83751388.

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A typical greenhouse heat balance shows a considerable heat load during the night and surplus heat during the day. This deals with the possibilities to collect the surplus heat by replacing a conventional shading device with inhouse solar collectors which consists of shadingweb between two layers of plastic film (PE). The plastic layers are sealed at the edge and the water which flows between the layers is dissipated by the web and at the same time the heat absorbed in the web is transfered to the water. The inhouse solar collector system is a part or a component in a low energy system with heat pump, watertank storage and storage of heat in soil. Measurements of parameters like the heat transfer coefficient between the inside air and the water in the collectors have been done. Computer simulations shows that the surplus heat could be collected with such and inhouse solar collector and that a fairly good climate could be achieved in an unventilated greenhouse. This requires however that the solar collectors can be supplied with enough cold water (requires heat pump) and that the surface temperature of the solar collectors can be controlled. The most serious problem concerns the hazards when having water flowing between the plastic film layers above the crops. A hole in the plastic layer might cause the water to drop to the ground and this could cause serious damage to the crop. The temperature of the plastic film has to be kept down by the cold water, otherwise the plastic will become soft, which might cause accumulation of water in bags in the collector. Evaluations of energy costs have to be carried out for whole systems, where the inhouse solar collector is a component in the system. In a particular system, investment costs for this component could be compared with investment costs for other alternative components which can provide the low energy heat, for instance external solar collectors.

9707 **(SOLAR/1120—83/14) Solar energy system performance evaluation update. Karasek Home, Blackstone, Massachusetts, April 1982-May 1983.** Raymond, M.G. (Vitro Labs., Silver Spring, MD (USA)). 1983. Contract AC01-79CS30027. 44p. NTIS, PC A03/MF A01. Order Number DE84004044.

The Karasek Home is a single family residence in Blackstone, Massachusetts. The active solar energy system is equipped with: 640 square feet of trickle-down liquid flat-plate collectors and a 300-gallon heat storage and 2000-gallon heat storage tanks embedded in a rock bin in the basement. An auxiliary oil-fired (0.5 gph) glass-lined 40-gallon Domestic Hot Water (DHW) tank is provided for DHW and space heating. A wood stove is also used. The system performance factor is 0.86, the COP is 13, and the solar fraction is 46%.

9708 **(TVA/OP/EC-R—82/92) Build-it-yourself solar water heater: reduce electric use.** (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Conservation and Rates). 1982. 17p. NTIS, PC A02/MF A01. Order Number DE84900365.

Drawings and instructions for a simple breadbox-style solar water heater are presented. This booklet is a step-by-step guide to building a solar water heater for approximately 15 percent of the cost of most commercially-installed systems. This system does not provide as much energy as the commercially available systems. (MHR)

9709 **Feasibility study on the ethanol-water solar fractionating system.** Schreyer, J.M.; Perona, J.J.; Williams, J.W. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Solar Energy;* **30**: No. 6, 545-554(Jun 1983). Contract W-7405-ENG-26.

In order to demonstrate the feasibility of vacuum distillation of alcohol by using flat-plate collectors to provide the energy, an experimental solar still was designed, constructed and tested. The complete system provided for water heating and storage and the fractionation of ethanol-water mixtures in the alcohol still. The results of our experiment confirm that such a system is technically practical for the production of better than 90 per cent ethanol.

9710 **Methodology to determine cost and performance goals for active solar cooling systems.** Warren, M.L.; Wahlig, M. *Journal of Solar Energy Engineering;* **105**: No. 2, 217-223(May 1983). Contract W-7405-ENG-48.

The attainment of reasonable market penetration of active solar cooling systems, beginning with introduction of commercial units in the late 1980's and continuing through the 1990's, can be related to meeting certain cost goals for these systems. The cost goals for systems to be installed between 1986 and 2000 are determined using economic and thermal performance analyses of typical residential and commercial active solar cooling systems. These goals are comprised of the payback period, the return on investment, the incremental solar system cost, and the cost-effectiveness. Using the results of systems analyses of representative 3-ton residential absorption cooling/heating systems, the incremental solar system cost goals are calculated for four cities (Fort Worth, Phoenix, Miami, and Washington, D.C.) for different years of purchase. For 25-ton commercial solar Rankine and absorption cooling systems, the incremental cost goals are calculated for three cities (Fort Worth, Phoenix, and Miami). Methods for achieving these cost goals are discussed.

9711 **A Fourier transform approach to building simulations with thermostatic controls.** Subbarao, K.; Anderson, J.V. (Solar Energy Research Institute, Golden, CO). pp 28-32 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Analyzing the thermal behavior of a linear system, such as a building (with some commonly made approximations), is greatly simplified in the frequency domain because of the decoupling of different frequencies. Thermostatic controls, an important part of building systems, invalidate this decoupling since they respond only to the temperature at a particular time (i.e., the sum of all frequencies). Nevertheless, we show here that by suitably formulating the problem, buildings with thermostatic controls can be simulated in the frequency domain, even when the setpoint is a function of time. We can thus obtain an hour-by-hour profile of indoor temperature and auxiliary energy requirements without doing an hour-by-hour simulation.

9712 **An evaluation of solar domestic hot water control systems.** Farrington, R. (Solar Energy Research Institute, Golden, CO). pp 39-44 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Literature on solar domestic hot water (SDHW) control systems was reviewed to assess results of control system performance and reliability. Seven SDHW control systems underwent six tests. Both the literature review and the testing indicate serious concerns with SDHW control system performance and reliability.

9713 **Evaluating the performance of passive solar heated buildings.** (Los Alamos National Laboratory, Los Alamos, NM). pp 96-102 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

Methods of evaluating the thermal performance of passive solar buildings are reviewed. Instrumentation and data logging requirements are outlined. Various methodologies that have been used to develop an energy balance for the building and various performance measures are discussed. Methods for quantifying comfort are described. Subsystem and other special-purpose monitoring are briefly reviewed. Summary results are given for 38 buildings that have been monitored.

9714 **Standards for passive solar heating and cooling systems.** Dikkers, R.D.; Reeder, B.C. (National Bureau of Standards, Center for Building Technology, Washington, DC). pp 103-108 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

The Department of Energy (DOE) Passive Solar Energy Program has been supporting research to develop a technology base for the preparation of uniform test methods, evaluation procedures and other standards for passive solar materials, components, assemblies, and systems. This paper describes the results of a DOE sponsored study to develop an initial planning framework for identifying existing voluntary standards which may be applicable to passive solar technologies as well as needed new standards.

9715 **Buoyancy-induced flow studies in thermally stratified loop of a double-envelope building.** Ghaffari, H.T.; Jones, R.F. (Brookhaven National Laboratory, Upton, NY). pp 122-127 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—). Contract AC02-76CH00016.

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

There is a wide interest in the flow studies of thermally stratified loops of double-envelope houses. These loops primarily serve to hold a moderate air temperature around the inner building, and to reduce thermal losses and air movements into the house by diminishing infiltration. Further, if the thermal mechanism of the building is well designed, it may be possible to cause a solar-assisted, buoyancy-induced cycling of the flow during the day and a probable reverse cycling during the night. The benefits of this flow pattern are a possible storage of heat in the ground level of the crawl space during the day, its retrieval at night, and a better mixing of warmed air in various zones of the loop. The double-envelope section of the building to be discussed here, was monitored from October 1981 to October 1982. Data collected were debugged and the monitoring system was adjusted and calibrated. Results from this experiment concerning significant local flows are analyzed. Hence, a validation of the conceptual thermal mechanism is obtained, and empirical and analytical assessments are compared.

9716 **Economic analysis of four passive cooling strategies for commercial office buildings.** Mangeng, C.A.; Roach, F. (Los Alamos National Laboratory, Los Alamos, New Mexico). pp 137-142 of Commercial building heating and cooling applications. New York, NY; A.S.M.E. (1983). (CONF-830405—).

From 6. annual ASME technical conference on commercial building heating and cooling applications; Orlando, FL, USA (19 Apr 1983).

This report presents an economic assessment of four passive solar cooling strategies whose performance was simulated in a typical single-story and multi-story office building. Economic performance of each passive cooling strategy was measured by computing total annual dollar savings in electricity bills, by calculating an investment target from a cash flow analysis, and by estimating regional and national savings potential assuming universal adoption of the strategy in new office buildings.

9717 **Solar energy almanac.** McPhillips, M. (ed.). New York, NY; Facts on File, Inc. (1983). 249p. (DOE/NBM—4003593). Facts on File, Inc., 460 Park Ave. South, New York, NY 10016 $15.95.

Among the topics covered in this book are: the passive solar house; the history of passive solar design; a career in solar energy; solar tax credits; solar energy's growth and potential; the underground house; the solar greenhouse; finding a solar designer or builder; solar access; solar use in the cities; storing solar heat; and solar communities. Also included are: tables of solar radiation; sources for further reading, and lists of manufacturers and other resources for those who wish to build a solar house. (MHR)

9718 **Passive solar investment: evaluating consumer cashflow preferences in light of uncertain future fuel costs.** Roach, F. (Los Alamos National Lab., NM); Kirschner, C.; Ben-David, S. pp 350-351 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

9719 **Analysis of the value of selected surface and latent heat storage for passive solar space heating.** Fthenakis, V.M.; Leigh, R.W. (Brookhaven National Lab., Upton, NY). pp 368-369 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—). Contract AC02-76CH00016.

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

1410 Solar Collectors And Concentrators

REFER ALSO TO CITATION(S) 9586, 9587, 9632, 9641, 9648, 9675, 9690, 9706

9720 **(DOE/CS/83111—T1) Degradation of evaporated aluminum films for solar reflectors. Final report, July 1, 1980-May 14, 1983.** Falconer, J.L. (Colorado Univ., Boulder (USA)). 29 Jul 1983. Contract FG02-80CS83111. 14p. NTIS, PC A02/MF A01. Order Number DE84005341.

The long-term goal of this research was to study the mechanisms of degradation on aluminum using Auger electron spectroscopy, work function measurements, and mass spectrometry detection. Aluminum has been proposed as a possible solar thin-film collector because of its high reflectivity. Studies were carried out in an ultrahigh vacuum system, which was connected through a valve to a high pressure system so that reactions could be carried out at atmospheric pressure. Reactions of O_2, CO, CO_2 and NO were carried out on a series of evaporated aluminum films. Detailed studies for CO_2 reactions were also carried out on aluminum foil standards. The effect of uv light and the effect of electron beams were studied, and in particular, a detailed study of electron beam effects from CO_2 adsorption was carried out.

9721 **(EUR—8347-EN) Comparison of collector performance measured in a solar simulator.** Hettinger, H. (Commission of the European Communities, Brussels (Belgium). Directorate General for Science, Research and Development). Mar 1981. 17p. Available from Commission of the European Communities, Luxembourg.

It has been shown that the Efficiency Integral Isub(E) is a very useful quantity to compare thermal collector performances, provided that the experimental conditions of the measurements are the same and that one considers only collectors conceived for the same purpose. There remains to be mentioned that performance is only one important quantity of a collector. Durability, geometry, safety and last but not least the price, are also very significant for the valuation of solar collectors. The collector J for example, resulted to have the highest Isub(E) in our tests which is mainly due to its selective surface and good thermal insulation. As a disadvantage this collector can reach a stagnation temperature of about 170°C at 20°C ambient temperature and an insolation of 1000 W/m^2, conditions which are frequent even in Northern Europe. An expensive safety system would be the consequence for the user who makes his choice only according to performance considerations.

9722 **(SAND—75-0079) Total hemispherical emittance measurement apparatus for solar selective coatings.** Pettit, R.B. (Sandia National Labs., Albuquerque, NM (USA)). Jun 1975. Contract AC04-76DP00789. 30p. NTIS, PC A03/MF A01. Order Number DE84005251.

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An apparatus designed to measure the total hemispherical emittance of solar selective coatings and metallic substrates over the temperature range 0°C to approximately 300°C is described. This apparatus utilizes a delta-power calorimetric measurement technique. After an error analysis is presented, emittance values of several metallic substrate materials are presented and compared with previous measurements.

9723 **(SERI/PR—255-2148) Solar Thermal Technology Program: polymer synthesis and characterization subtask. Annual progress report, FY 1983.** Schissel, P.; Neidlinger, H.H. (Solar Energy Research Inst., Golden, CO (USA)). Dec 1983. Contract AC02-83CH10093. 56p. NTIS, PC A04/MF A01. Order Number DE84000094.

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Initial candidate methods for protecting the polymeric glazing and the metallic layer from degradation by ultraviolet light (uv) and candidate new polymeric materials have been identified. The characteristics of photodegradation permit the application of methods involving both photon absorption and transfer of electronic energy. Generally, photostabilizers for polymers are classified according to their mode of action: uv light absorbers, excited state quenchers, antioxidants, and hydroperoxide decomposers. We have selected the radical copolymerization of monomeric uv absorbers with methylmethacrylate and related monomers for our initial system. The first step is to evaluate absorbers mixed with the polymethylmethacrylate system. Mirrors are made using Corning 7809 glass as a substrate onto which a thin silver film is deposited, and the modified polymeric films are then cast from solution onto the silver. Mirrors are characterized by measuring the hemispherical reflectance as a function of wavelength and by determining the solar-weighted hemispherical reflectance. Mirrors are exposed to environmental degradation using accelerated weathering devices and outdoor exposure. We have demonstrated that uv absorbers added to polymethylmethacrylate can improve the weathering performance of mirrors. A benzotriazole absorber has performed best. Experiments on the present task also show that benzotriazole absorbers stabilize polyester films. Unstabilized polyacrylonitrile glazings have also performed well. We have observed that prior treatment of the mirror with uv light can improve the adhesion. We have also observed that the process for silver deposition influences the initial reflectivity of silver mirrors.

9724 **(SERI/TR—255-1602) Experimental approach to evaluating environmental degradation mechanisms in bisphenol-A polycarbonate films on metallic substrates.** Webb, J.D. (Solar Energy Research Inst., Golden, CO (USA)). Nov 1983. Contract AC02-83CH10093. 119p. NTIS, PC A06/MF A01. Order Number DE84000025.

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A technique is presented for in situ study of degradative changes in bisphenol-A polycarbonate (BPA-PC) coatings on metallic substrates. The technique uses a controlled environmental exposure chamber in conjunction with a Fourier transform infrared spectrophotometer. The chamber design permits collection of infrared reflection-absorbance (IR-RA) spectra from a sample undergoing exposure to controlled ultraviolet radiation, gas mixtures, and temperatures. A technique for relating the IR-RA band heights measured with the apparatus to the concentration of polymeric functional groups and reaction products in the coatings is presented. Comparison of the results of uv and ir spectroscopy with those obtained using gel permeation chromatography to determine changes in the molecular weight distribution of the BPA-PC films following exposure enabled identification of several degradation pathways. The major mechanisms, in order of importance, appear to be the first and second photo-Fries rearrangements at carbonyl, and chain scission, also at carbonyl. The quantum yield of the first photo-Fries reaction product, measured using IR-RA, was 0.020+-0.004. Some evidence for photooxidation of the BPA-PC methyl functional groups is also presented. The techniques presented should be applicable to the study of both surface and interfacial degradation, especially with samples having polymer film thicknesses within the optimum range (0.1 to 1.0 μm).

9725 **(UT/CES-SS—2) Precision of solar collector testing and selection of instruments of measurement.** Huang, H.; Howell, J.R. (Academia Sinica, Beijing (China). Inst. of Energy Conversion; Texas Univ., Austin (USA). Center for Energy Studies). Jun 1983. 34p. NTIS, PC A03/MF A01. Order Number DE84900445.

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An important problem for solar collector testing is to determine the allowable error for each parameter and then to select the proper instruments, measurement procedures, and arrangement. To attain this aim, the relation between the deviation of testing results and measuring errors has been analyzed statistically. A computer program HWBERR has been created to predict the deviation of testing results under a variety of testing situations.

9726 **(UT/CES-SS—3) Monte Carlo prediction of the thermal performance of the tubular solar collector with reflector.** Huang, H. (Texas Univ., Austin (USA). Center for Energy Studies; Academia Sinica, Beijing (China). Inst. of Energy Conversion). Aug 1983. 39p. NTIS, PC A03/MF A01. Order Number DE84900452.

The thermal analysis of evacuated-tube collectors is difficult. In order to solve this problem quickly and easily, the Monte Carlo technique is introduced. The fact that digital computers are so widely used provides the possibility to analyze a complex problem with a statistical method instead of with integral equations. The general procedure of the Monte Carlo method for this kind of problem is interpreted in detail. A thermal analysis of a nonconcentric ETC is demonstrated as an illustration.

9727 **Thermal model of a cylindrically symmetric solar pond.** Dhingra, K.; Bryant, H.C. (Department of Physics and Astronomy, The University of New Mexico, Albuquerque, NM 87131). *Solar Energy;* **30**: No. 6, 589-596(Jun 1983).

A finite element heat transport program has been modified to model the thermal behavior for a cylindrically symmetric salt gradient polar pond of the Rabl-Nielsen type. In this model transient phenomena as well as steady state behavior can be studied. Results are presented for a model of the solar pond at the University of New Mexico and are compared with actual measurements.

9728 **Performance benefits of the direct generation of steam in line-focus solar collectors.** May, E.K.; Murphy, L.M. (Thermal Systems and Engineering Branch, Solar Energy Research Institute, Golden, CO 80401). *Journal of Solar Energy Engineering;* **105**: No. 2, 126-133(May 1983).

The performance benefits of the direct (in situ) generation of steam in the receiver tube of a line-focus solar collector are assessed in this paper. Compared to existing technology using steam-flash or unfired boiler systems, the in situ technique could reduce the delivered cost of steam in excess of 25 percent. The analysis indicates that two-phase flow instabilities, if present, can be readily controlled, and that the possibility of freezing is not an impediment to the use of water in cold climates.

1420 Heat Storage

REFER ALSO TO CITATION(S) 9635, 9696

15 GEOTHERMAL ENERGY

9729 **(LBL—15500) Earth Sciences Division annual report, 1982.** (Lawrence Berkeley Lab., CA (USA)). Sep 1983. Contract AC03-76SF00098. 289p. NTIS, PC A13/MF A01. Order Number DE84003916.

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Separate abstracts were prepared for individual reports. (MHR)

1501 Resource Status And Assessment

REFER ALSO TO CITATION(S) 9733

1502 Geology And Hydrology Of Geothermal Systems

REFER ALSO TO CITATION(S) 9731, 9734, 9738

9730 **(NMERDI—2-67-2238(2)) Subsurface investigations for the area surrounding Tortugas Mountain, Dona Ana County, New Mexico.** Gross, J.; Icerman, L. (New Mexico State Univ., Las Cruces (USA). New Mexico Energy Inst.). Dec 1983. 75p. New Mexico Energy Research and Development Inst., Information Center, University of New Mexico, Suite M, 457 Washington SE, Albuquerque, NM 87106.

The local geology in the vicinity of Tortugas Mountain, adjacent to the New Mexico State University and Chaffee Geothermal, Ltd. geothermal well fields, was examined in terms of structure and stratigraphy. Nine lithologic logs and eight graphic columns, based on 912 drilling samples from nine geothermal wells, were prepared to identify the local subsurface geology. A 13,000-foot geologic cross section, extending from Tortugas Mountain to the east to approximately Interstate Highway 25 to the west, was generated from the lithologic data. A two-segment 1.6-mile seismic reflection survey was conducted to further define the subsurface structure in the area. The results of this work contribute to the understanding of the local subsurface geologic structure controlling the known geothermal reservoir and should be a valuable input to the selection of the optimal drilling strategy for future geothermal energy production walls located adjacent to Tortugas Mountain.

1503 Geothermal Exploration And Exploration Technology

REFER ALSO TO CITATION(S) 9730, 9738

9731 **(NP—4900578) Discovery and geology of the Desert Peak geothermal field: a case history. Bulletin 97.** Benoit, W.R.; Hiner, J.E.; Forest, R.T. (Nevada Univ., Reno (USA)). Sep 1982. 208p. Nevada Bureau of Mines and Geology, Univ. of Nevada Reno, Reno, NV 89557 $12.00.

A case history of the exploration, development (through 1980), and geology of the Desert Peak geothermal field is presented. Sections on geochemistry, geophysics, and temperature-gradient drilling are included.

9732 **(NYSERDA—83-5) Exploration and drilling for geothermal heat in the Capital District, New York. Final report.** (Dunn Geoscience Corp., Latham, NY (USA)). Aug 1983. 172p. New York State Energy Research and Development Authority, Albany, NY 12223.

The Capital District area of New York was explored to determine the nature of a hydrothermal geothermal system. The chemistry of subsurface water and gas, the variation in gravity, magnetism, seismicity, and temperature gradients were determined. Water and gas analyses and temperature gradient measurements indicate the existence of a geothermal system located under an area from Ballston Spa, southward to Altamont, and eastware toward Albany. Gravimetric and magnetic surveys provided little useful data but microseismic activity in the Altamont area may be significant. Eight wells about 400 feet deep, one 600 feet and one 2232 feet were drilled and tested for geothermal potential. The highest temperature gradients, most unusual water chemistries, and greatest carbon dioxide exhalations were observed in the vicinity of the Saratoga and McGregor faults between Saratoga Springs and Schenectady, New York, suggesting some fault control over the geothermal system. Depths to the warm fluids within the system range from 500 meters (Ballston Spa) to 2 kilometers (Albany).

1505 Economic And Financial Aspects

9733 (P—500-83-003) Report to the Legislature on the California Energy Commission's Geothermal Development Grant Program for Local Governments. (California Energy Resources Conservation and Development Commission, Sacramento (USA)). Apr 1983. 44p. California Energy Commission, 1516 9th Street, Sacramento, CA 95814.

This report documents the California Energy Commission's administration of its Geothermal Development Grant Program for Local Governments. The Energy Commission established this program as a result of the passage of Assembly Bill 1905 (Bosco) in 1980. This legislation established the mechanism to distribute the state's share of revenues received from the leasing of federal mineral reserves for geothermal development. The federal government deposits these revenues in the Geothermal Resources Development Account (GRDA) created by AB 1905. The state allocates funds from the GRDA to the California Parklands and Renewable Resources Investment Fund, the counties of origin where the federal leases are located, and the Energy Commission. The legislation further directs the Energy Commission to disburse its share as grants to local governments to assist with the planning and development of geothermal resources. Activities which are eligible for funding under the Energy Commission's grant program include resource development projects, planning and feasibility studies, and activities to mitigate the impacts of existing geothermal development.

1506 Environmental Aspects And Waste Disposal

REFER ALSO TO CITATION(S) 9738

9734 (EGG-M—23983) Physical model of a fractured reservoir. Hull, L.C.; Koslow, K.N. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 5p. (CONF-831253—3). NTIS, PC A02/MF A01. Order Number DE84005305.

From 9. workshop on geothermal reservoir engineering; Stanford, CA, USA (13 Dec 1983).

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The objectives of the physical modeling effort are to: (1) evaluate injection-backflow testing for fractured reservoirs under conditions of known reservoir parameters (porosity, fracture width, etc.); (2) study the mechanisms controlling solute transport in fracture systems; and (3) provide data for validation of numerical models that explicitly simulate solute migration in fracture systems. The fracture network is 0.57-m wide, 1.7-m long, and consists of two sets of fractures at right angles to one another with a fracture spacing of 10.2 cm. A series of injection-backflow tests, similar to those performed at the Raft River Geothermal field, was conducted. These included variable volume injection and injection-backflow tests with varying quiescent periods between injection and backflow. This latter series of tests was conducted with a range of flow fields passing through the model. Tracer recovery is related to the flow field in the physical model and model parameters. Longer quiescent times and greater flow fields result in a lower tracer recovery. A plot of the fractional tracer recovery against quiescent time results in a straight line. This relationship, combined with classical reservoir engineering data, can be used to predict aquifer flow rate and porosity from known injection volumes and tracer recovery.

9735 (EGG-M—24883) Response of east Mesa and Raft River reservoirs to injection-backflow testing. Russell, B.F.; Hull, L.C.; Downs, W.F. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 5p. (CONF-831253—2). NTIS, PC A02/MF A01. Order Number DE84005099.

From 9. workshop on geothermal reservoir engineering; Stanford, CA, USA (13 Dec 1983).

Analysis of tracer recovery curves from injection-backflow testing at two geothermal reservoirs reveals large differences in responsebetween the two. The east Mesa reservoir is in a layered sandstone matrix, and tracer behavior can be adequately described by porous media theory. As the volume of water injected into the reservoir increases and, consequently, the depth of penetration into the formation, the ratio of dispersive flux to advective flux decreases, indicating the increasing importance of advective transport. This effect can be seen in normalized tracer recovery curves that become more symmetrical with greater injection volume. At the Raft River site, the reservoir is dominated by a single major fracture zone. Injecting larger volumes of water into the fracture does not change the shape of the normalized tracer recovery curves. This indicates that the dispersion coefficient increases proportionally to the distance traveled by the injection front. Differences in the shape of tracer recovery curves are related to fundamental differences in reservoir characteristics. Long tails on the tracer recovery curves at Raft River suggest a dual porosity reservoir with a secondary fracture network connected to the major fracture. Such findings may considerably affect calculations of secondary heat recovery using injection wells.

1508 Geothermal Power Plants

REFER ALSO TO CITATION(S) 9761

9736 (DOE/SF/11503—2) Review of shell-and-tube heat exchanger fouling and corrosion in geothermal power plant service. Ellis, P.F. II. (Radian Corp., Austin, TX (USA)). Dec 1983. Contract AC03-81SF11503. 68p. NTIS, PC A04/MF A01. Order Number DE84004539.

Heat exchangers for hot geofluid/working substance vaporizers for binary power plants are considered. A brief description of the physical test apparatus and the geofluid chemistry for each of the several heat exchanger tests is presented. The fouling data developed from these tests are summarized, in most cases presenting a mathematical expression for the increase in fouling factor with time. The materials performance data developed from these same tests are explored. The performance of shell-and-tube heat exchangers used as condensers and ancillary coolers in the power plant heat rejection system is considered.

9737 Condensation of R-11 on the outside of vertical enhanced tubes. Domingo, N. (Oak Ridge National Lab., TN). pp 299-300 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

1509 Geothermal Engineering

9738 (DOE/ID—10117) Hydrothermal Injection Research Program. Annual progress report, FY 1983. Blackett, R.E.; Kolesar, P.T.; Capuano, R.G.; Sill, W.R.; Allman, D.W.; Hull, L.C.; Large, R.M.; Miller, J.D.; Skiba, P.A.; Downs, W.F. (Utah Univ., Salt Lake City (USA). Research Inst.; EG and G Idaho, Inc., Idaho Falls (USA)). Nov 1983. Contract AC07-76ID01570. 69p. NTIS, PC A04/MF A01. Order Number DE84005012.

The test program was initiated at the Raft River Geothermal Field in southern Idaho in September of 1982. A series of eight short-term injection and backflow tests followed by a long-term injection test were conducted on one well in the field. Tracers were added during injection and monitored during backflow of the well. The test program was successful, resulting in a unique data set which shows promise as a means to improve understanding of the reservoir characteristics. In December of 1982 an RFP was issued to obtain an industrial partner to obtain follow-on data on the injection/backflow technique in a second field and to study any alternate advanced concepts for injection testing which the industrial community might recommend. Republic Geothermal, Inc. and the East Mesa Geothermal Field were selected for the second test series. Two wells were utilized for testing, and a series of ten tests were conducted in July and August of 1983 aimed principally at further evaluation of the injection/backflow technique. This test program was also successfully completed. This report describes in detail the analysis conducted on the Raft River data, the supporting work at EG and G Idaho and at ESL/UURI, and gives an overview of the objectives and test program at East Mesa.

9739 **(SAND—83-0130) Program for the improvement of downhole drilling motors.** Finger, J.T. (Sandia National Labs., Albuquerque, NM (USA)). Nov 1983. Contract AC04-76DP00789. 74p. NTIS, PC A04/MF A01. Order Number DE84005063.

This report describes the work done under contract to Sandia National Labs and to the Department of Energy for improvement of downhole drilling motors. The focus of this program was the development of a better bearing-and-seal assembly that could be used in different kinds of drilling motors in a geothermal environment. Major tasks were: (1) design and construction of seal testing devices, (2) screening and evaluation of candidate seals in a simulated bearing/seal package, (3) tests of the most promising candidates in a full-scale bearing/seal package, and (4) analysis of failed seals after testing. The key results from this program were: (1) identification of seal/shaft/lubricant systems that performed well at high pressure and temperature, (2) identification of other seal designs that should be avoided for similar applications, and (3) evaluation of the test machines' design.

9740 **The impact of common completion and workover activities on the effective costs of geothermal wells.** Carson, C.C.; Mansure, A.J. (Sandia National Laboratories). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11155**: 1-9(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

Drilling and completing wells at minimum initial cost may not be the most cost effective way to exploit the geothermal resource. The impacts of completion practices on production and maintenance costs must also be considered. To evaluate alternative completion and workover technologies, a simple model has been developed that compares total well cost to total production or injection. This paper briefly discusses the model and focuses on results from its application to different completion and workover strategies. The results discussed include an analysis of the impact of variations in well lifetime. Additional lifetime beyond 10 to 15 years adds little value to the well. A comparison of mechanical descaling of geothermal wells to chemical scale inhibition indicates that for certain conditions chemical inhibition is more cost effective. Results of an analysis of injectivity decline are also presented, as are studies of original well cost, initial flow rate, and productivity decline for production wells. Other results involving underreaming, changing casing profiles, perforating, and hydraulic fracturing are also discussed.

9741 **Nonisothermal effects during injection and fall-off tests.** Benson, S.M.; Bodvarsson, G.S. (Lawrence Berkeley Laboratory). *Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical and Petroleum Engineers), Paper;* **SPE11137**: 1-16(Sep 1982). (CONF-820927—).

From 57. AIME Society of Petroleum Engineers annual technical conference and exhibition; New Orleans, LA, USA (26 Sep 1982).

In this study numerical simulation of pressure transients during injection and fall-off tests are used to develop methods for obtaining the reservoir transmissivity and the skin value. A numerical simulator, PT (Pressure-Temperature), is used to simulate injection and falloff pressure transients. The results show that in the analysis of pressure data affected by a moving thermal front, the fluid properties corresponding to the temperature of the injected water must be used. On the other hand, in the analysis of fall-off tests, fluid properties corresponding to the reservoir fluids are appropriate. It is also shown that the application of conventional isothermal methods for calculating skin values from injection and fall-off data will give erroneous results. The authors present a new method for calculating skin values from injection and fall-off tests, that accurately corrects for nonisothermal effects. A number of detailed examples are given that illustrate the suggested method of analysis. Furthermore, it is applied to an injection test at the East Mesa Geothermal field in Southern California.

1510 Direct Energy Utilization

REFER ALSO TO CITATION(S) 9658

9742 **(DOE/ET/28419—7) Direct utilization of geothermal energy in western South Dakota agribusiness. Final report.** Howard, S.M. (South Dakota School of Mines and Technology, Rapid City (USA). Dept. of Metallurgical Engineering). Sep 1983. Contract FC07-76ET28419. 98p. NTIS, PC A05/MF A01. Order Number DE84005320.

This project involved the direct utilization of geothermal energy for (1) space heating of farm and ranch buildings, (2) drying grain, and (3) providing warm stock water during the winter. The site for this demonstration project was the Diamond Ring Ranch north of Midland, South Dakota. Geothermal water flowing from an existing well into the Madison Aquifer was used to heat four homes, a shop, a hospital barn for cattle, and air for a barn and grain dryer. This site is centrally located in the western region of South Dakota where geothermal water is available from the Madison Aquifer. The first year of the project involved the design of the heating systems and its construction while the following years were for operation, testing, demonstrating, and monitoring the system. Required modifications and improvements were made during this period. Operating modifications and improvements were made during this period. Operating experience showed that such application of geothermal resources is feasible and can result in substantial fuel savings. Economic analyses under a variety of assumptions generally gave payback periods of less than ten years. Numerous technical recommendations are made. The most significant being the necessity of passive protection from freezing of remote geothermal systems subject to winter shut downs caused by power or equipment failure. The primary institutional recommendation is to incorporate a use for the geothermal water such as irrigation or stock watering into agribusiness-related geothermal development.

9743 **(DOE/SF/00700—T5) Groundwater and geothermal: urban district heating applications.** Mounts, R.; Frazier, A.; Wood, E.; Pyles, O. (Rockwell International Corp., Canoga Park, CA (USA). Energy Technology Engineering Center). 1982. Contract AC03-76SF00700. 105p. NTIS, PC A06/MF A01. Order Number DE84005256.

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This report describes how several cities use groundwater and geothermal energy in district heating systems. It begins with groundwater, introducing the basic technology and techniques of development, and describing two case studies of cities with groundwater-based district heating systems. The second half of the report consists of three case studies of cities with district heating systems using higher temperature geothermal resources.

17 WIND ENERGY

REFER ALSO TO CITATION(S) 9583

1705 Environmental Aspects

9744 **(SERI/STR—211-2086) Television interference measurements near the MOD-2 WT array at Goodnoe Hills, Washington.** Sengupta, D.L.; Senior, T.B.A.; Ferris, J.E. (Solar Energy Research Inst., Golden, CO (USA)). Nov 1983. Contract AC02-83CH10093. 63p. NTIS, PC A04/MF A01. Order Number DE84000030.

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Electromagnetic interference to television reception caused by the MOD-2 wind turbine (WT) array at Goodnoe Hills, Washington, was studied by means of detailed measurements at a number of test sites in the vicinity of the WT array. The commercial television signals available in the area were used as the radio frequency sources during the measurements. The dynamic measurements indicated that varying amounts of TVI were produced at all sites and on some or all of the available TV channels; with the directional antenna in use, most of the backward region interference produced

video distortion that was judged to be acceptable; at one test location about 1-1/2 miles from the WT array site, forward region interference was observed; when the blades of the WTs rotate in synchronism, they tend to increase the amplitude of the interference pulses, thereby producing more TVI effects; and when the blades do not rotate in synchronism, each WT produces interference effects individually.

1706 Wind Energy Engineering

REFER ALSO TO CITATION(S) 9705

9745 **(DOE/CS/89000—T1) Investigation of the aerodynamics of horizontal-axis wind turbine rotors. Final technical report.** Cromack, D.E.; Slager, L.W.; Po, M.A. (Massachusetts Univ., Amherst (USA). Dept. of Mechanical Engineering). Sep 1981. Contract FG02-80CS89000. 37p. NTIS, PC A03/MF A01. Order Number DE84005245.

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This report describes the work accomplished under the first year effort, of a proposed two-year program, in an investigation of the aerodynamics of horizontal axis wind turbine rotors. Included is a description of the data acquisition system for the Wind Rotor Test Facility as well as an extensive review of the literature on the aerodynamic theories developed to date. This review is for the background leading to the formulation of a synthesized rotor performance theory and computer code.

9746 **(DOE/ET/20261—T1) Measurements on the Gedser wind mill, 1977-1979.** Lundsager, P.; Christensen, C.J.; Frandsen, S. (eds.). (Risoe National Lab., Roskilde (Denmark)). Nov 1979. Contract FC01-77ET20261. 200p. NTIS, PC A09/MF A01. Order Number DE84005354.

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This report describes the experimental apparatus for studying the dynamic behavior of the Gedser Wind Mill in Denmark. Also described is the type of data coming out of the experiment. Data include meteorological measurements, structural measurements, power characteristics, as well as data checks and accuracy. The apparatus met with severe problems due to the extreme environment. the rotor is found to be aerodynamically and structurally symmetric. Stresses are generally low. It is illustrated that turbulent fluctuations in the wind excite considerable power fluctuations. (LEW)

9747 **(DOE/ET/20261—T2) Analysis of data from the Gedser wind turbine, 1977-1979.** Lundsager, P.; Frandsen, S.; Christensen, C.J. (Risoe National Lab., Roskilde (Denmark)). Aug 1980. Contract FC01-77ET20261. 134p. NTIS, PC A07/MF A01. Order Number DE84005353.

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In this report a number of topics have been chosen for further analysis, based on the data from the Gedser wind turbine measurements, made during 1977 to 1979. The report deals with power characteristics based on 10 min averages, coherence between measurements of wind and electric power based on high speed scanning, drive train oscillations and structural response of the rotor. Theoretical models are developed and evaluated. The measurements are summarized and the Gedser wind turbine is compared with modern Danish, Swedish and American experimental wind turbines, based on published data.

9748 **(DOE/NASA/20305—9) Mod-2 wind turbine development.** Gordon, L.H.; Andrews, J.S.; Zimmerman, D.K. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center; Boeing Engineering and Construction, Tukwila, WA (USA)). 1983. Contract AI01-77ET20305. 27p. (CONF-830631—14). NTIS, PC A03/MF A01. Order Number DE84004216.

From 6. biennial wind energy conference; Minneapolis, MN, USA (1 Jun 1983).

This paper addresses the development of the Mod-2 turbine, which was designed to achieve a cost of electricity for the 100th production unit that will be competitive with conventional electric power generation. The Mod-2 wind turbine system (WTS) background, project flow, and a chronology of events and problem areas leading to Mod-2 acceptance are addressed. The role of the participating utility during site preparation, turbine erection and testing, remote operation, and routine operation and maintenance activity is reviewed. The technical areas discussed pertain to system performance, loads, and controls. The proposed role of the Goodnoe Hills Cluster Research Test Facility for research and technical development of multimegawatt turbines is summarized.

9749 **(DOE/R5/10309—2) WECS: load controlled pitch - variable load conversion to heat. Progress report No. 2.** Secord, N.W. (Secord (Nelson W.), Brighton, MI (USA)). 30 Sep 1983. Contract FG02-81R510309. 10p. NTIS, PC A02/MF A01. Order Number DE84004799.

There are two main objectives of this grant. The first is to develop load control circuitry such that all excess energy from the windmill that would normally go back to Edison be absorbed in thermal storage to heat domestic hot water. This has been completed, including the instrumentation to determine the mill efficiency as a function of windspeed. There are perhaps six hours of work remaining to fine tune the software program for the load control. The load control is functioning, but it's response needs improvement. The second objective is to develop a torque-controlled pitching hub and blade system.

9750 **(DOE/R5/10309—3) WECS - load controlled pitch - variable load conversion to heat. Final report.** Secord, N. (Secord (Nelson W.), Brighton, MI (USA)). 26 Nov 1983. Contract FG02-81R510309. 147p. NTIS, PC A07/MF A01. Order Number DE84005328.

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Load control circuitry was developed such that excess energy from a windmill, that would normally go back to the utility, be absorbed in thermal storage to heat domestic hot water. Also, associated with this objective is the development of instrumentation to measure the power curve of the windmill as a function of windspeed. An Enertech 4KW windmill and related equipment was used to meet this objective.

9751 **(EEV—83-01) Offshore wind power in Denmark.** (Danske Elvaerkers Forening, Copenhagen). Mar 1983. 154p. (In Danish). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83751373.

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The technical and economic conditions of placing offshore wind power plants in the Danish waters are analysed. A survey is made of the wind power resources in the Danish waters, and an upper limit of wind power production is calculated. A rough design is made of a wind turbine construction for offshore sites, and some technical problems in connection with offshore parks are described. Two alternatives for a Danish offshore wind power production of 4 TWh/year are described. Production method and plant are described, and a scenario is made for operation and maintenance of the turbine parks. Based on this the costs of construction, operation, and maintenance are evaluated. An economic comparison is made between offshore and onshore wind power production, and between wind power production and conventional power production.

9752 **(LiTH-IKP-R—288) Strategy for optimization of wind energy systems.** Westberg, S. (Linkoeping Univ. (Sweden). Dept. of Mechanical Engineering). Jan 1983. 28p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751404.

This paper presents a strategy to deal with wind energy systems as an optimization problem. The attempt is to create a general procedure to describe a complete system. The system is divided into three independent parts, the application, the wind turbine and the state of wind. In this way the problem becomes more surveyable and each part can easily be changed while the others are unaffected. An illustrative example is described where a wind rotor is directly connected to the compressor of a heat pump.

9753 **(ME-RT—82009) New theory for the conversion of solar-derived wind energy using oscillating cascades of airfoils. Final technical report.** Sisto, F.; Lee, W.H.; Sridhara, B.S. (Stevens Inst. of Tech., Hoboken, NJ (USA). Dept. of Mechanical Engineering). Aug 1982. Contract FG02-80CS89003. 132p. NTIS MF A01. Order Number DE84005244.

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A cascade of oscillating airfoils is examined analytically and by parametric study. The objective is to assess the capability of extracting energy from the wind. It is found that the device is an attractive alternative to the windmill in applications where the more sophisticated mechanical design is warranted. A basic experiment is also described.

9754 **(NE-VIND—83-14) LDB-VAWT: Executive summary.** (Naemnden foer Energiproduktionsforskning, Stockholm (Sweden)). Dec 1982. 48p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751399.

Portions are illegible in microfiche products; Vertical Axis Wind Turbine with L-turbine and Double Blades.

The LDB concept, is characterized by L-Turbine blade arrangement with two blade assemblies of troposkien shape mounted 90 degrees apart in the direction of rotation, and DB, double blade configuration with each blade assembly consisting of two blade elements in parallel. The work in this phase is concentrated on technical/economical feasibility studies of critical subsystems in large LDB-VAWT configurations, supplemented by a general updating from the previous study of performance and cost affectiveness. The initial study inidcated that an optimum size for large LDB-VAWT units for off-shore siting may be around, or slightly above, 100 m rotor diameter. Accordingly, the baseline unit in the current study has been selected at 125 m diameter, with a corresponding rated power output of approx. 10 MW. Parametric analysis is used extensively in the study to illustrate the effect of scaling down the turbine size, to a minimum of 30 m diameter. The study thus covers a range of rated power from 0.4 to 9.4 MW. In the initial study the rotor blades, rotor tower, rotor bearing, and transmission were identified as critical subsystems as regards design, cost and performance. Therefore, these subsystems have been studied further in considerable detail, and several improvements have been developed during phase 2. In general, the study indicates that the proposed improved LDB-VAWT design is technically and economically feasible, in sizes up to 100 - 125 m diameter. This summary gives a brief account of the major results of the study, illustrated by selected figures and tables from the main report.

9755 **(NP—3751372) Wind turbine parks. Analysis of sites.** (Jysk-Fynske Elsamarbejde (ELSAM), Fredericia (Denmark)). Apr 1983. 170p. (In Danish). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83751372.

Sites for 46 wind turbine parks are selected in the area of the Jutland-Funen cooperative electric utilities - ELSAM, where it is possible to place about 600 wind turbines of 2,5 MW each. A wind turbine park can have about 15 wind turbines. The report briefly describes the wind conditions in Denmark, the landscape, and the problems connected with siting of wind turbines. The work of the Danish National Agency for Physical Planning on wind turbine siting is briefly described, because the final decision on wind turbine sites is to be made by that agency. The two main parts of the report contain calculations of the expected wind power production, the connecting costs, and detailed descriptions of the selected wind turbine parks.

9756 **(RISO-M—2392) Blade- and rotor loads for VESTAS 15.** Rasmussen, F. (Risoe National Lab., Roskilde (Denmark)). Jun 1983. 50p. (In Danish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751370.

This report contains a comparison of measurements and calculations of aerodynamic blade- and rotor forces for a stall-controlled VESTAS 15 windmill. The investigation focuses on the situation in skew wind, as the blade forces are found as a function of the three basic parameters: windspeed,yaw angle and blade position. The comparison is based on stationary conditions, but measurements also give statistic loads superimposed on the dynamic loads that are already present under stationary conditions mainly in skew wind. Lift- and drag coefficients for the blade profiles are calculated iteratively from measurements of blade root bending moment in two directions as a function of windspeed unde axial airflow.

20 ELECTRIC POWER ENGINEERING

9757 **(DOE/ET/29127—1) Qualitative methods in power system stability.** Washburn, R.B. Jr.; Baillieul, J.; Mehra, R.K. (Scientific Systems, Inc., Cambridge, MA (USA)). Jan 1982. Contract AC01-78ET29127. 96p. NTIS MF A01. Order Number DE84005503.

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This report investigates the application of qualitative methods of nonlinear analysis to problems of power system stability. It examines applications of bifurcation analysis, continuation methods, algebraic-geometry, differential topology, differentiable dynamical systems and functional (input-output) analysis to analyze nonlinear dynamical systems such as those used to model the behavior of an electric power system. The work reported here hs developed computational methods of analysis, both numerical and non-numerical; and it uses simple power system stability examples to illustrate the general methods.

9758 **(DOE/ET/29365—4) Decentralized control of large transient in power systems: theory and application.** (Purdue Univ., Lafayette, IN (USA)). Aug 1983. Contract AC01-79ET29365. 105p. NTIS, PC A06/MF A01. Order Number DE84005506.

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Chapter 1 describes a continuation algorithm to construct decentralized state feedback gains which place the natural frequencies (natural modes of vibration or eigenvalues) of a linearized power system at desired locations. Further insights were made and the research led to the development of a user oriented computer program. Chapters 2 and 3 address the problem of designing a decentralized dither control for two linearly interconnected synchronous machines, each of which is nonlinear. Intuitively, dither control is a fast switching feedback control. The time constants must be much smaller than the reference input's time constant so that the system will track the reference input. However, if the time constants are very large, the feedback gains may cause the control input to exceed permissible amplitudes on the system inputs. These ideas are discussed in Chapters 2 and 3 in the context of a one and a two machine system. In Chapter 2, the theory finds application to the nonlinear third order model of a single machine infinite bus system where the primary control is via an ac-dc converter. Similarly Chapter 3 considers a two-machine system with individual machine converters acting as the primary control. Computer simulations of the control action given various system perturbations are found in both Chapters 2 and 3.

9759 **(UCRL—15568-1) Engineering study for an electrical power distribution system for Lawrence Livermore National Laboratory.** (Brown and Root Development, Inc., San Francisco, CA (USA)). Oct 1983. Contract W-7405-ENG-48. 552p. NTIS, PC A24/MF A01. Order Number DE84003955.

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Objective of the electrical distribution system study for the Lawrence Livermore National Laboratory (LLNL) was to: define existing problems with the University's electrical power distribution system and provide recommendations for solving these problems; define potential problems and recommend ways to avoid them from happening; and provide a guide for orderly growth, development and improvement of the LLNL power system.

2001 Power Plants And Power Generation

REFER ALSO TO CITATION(S) 9947, 9952, 9965, 10040, 10041, 10048, 10049, 10166

9760 (CONF-820290—1, pp 17) Implementation of distributed process automation systems in power plants. Lausterer, G.; Wilhelm, H. [nd]. (In German). NTIS (US Sales Only), PC A02/MF A01.

From Meeting on methods of controlling complex dynamic systems; Bonn, F.R. Germany (15 Feb 1982).

Like all process automation systems, power plant automation systems are influenced by the developments of modern microelectronics. Whereas the systems so far were characterized by the technique of programmed connections and single wiring, the new memory-programmed decentralized systems allow data transfer via bus systems as well as operator and observation functions via consoles. Instead or besides the process computer, that takes over the functions of the supervisor, the alarms, the actual value calculations, the balancing and the protocol, there is the decentralized "distributed intelligence" of the microprocessors. Where as the central DDC concept (direct digital control) is implemented only in a few plants (due to availability problems) the digital algorithms can now be employed on a broad basis. However, the possibilities of the digital control systems are only used to a limited extent (e.g. use of modern control theories) with reference to improved automatization concepts.

9761 (CONF-831239—3) SALT steady state systems code. Berry, G.; Geyer, H. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE84005266.

From Systems simulation symposium of fossil fuel conversion processes; Morgantown, WV, USA (6 Dec 1983).

A steady state system code has been developed at ANL and has been used to analyze or evaluate the following technologies: open cycle magnetohydrodynamics (MHD), liquid metal MHD, fuel cells, combined cycle coal gasification plants, pulverized coal fired power plants with flue gas desulfurization, pressurized and atmospheric fluidized bed combustion plants, municipal solid waste disposal systems, geothermal systems, fusion reactor coolant systems, nuclear power plants, and ocean thermal energy conversion power plants. The SALT systems code contains many unique and state-of-the-art features that have promoted its use in the many extensive systems. These features are: (1) a language translator, which allows free format and unsorted input; (2) a preprocessor, which allows great flexibility in defining a system and permitting the user to generate his own labels; (3) a state-of-the-art hybrid nonlinear N-dimensional equation solver that is extremely fast and robust (this algorithm has been incorporated in the latest version of the EPRI dynamic systems code (MMS) to find the steady-state solution), (4) a state-of-the-art optimizer; (5) a chemical-equilibrium subroutine for calculating thermodynamic gas properties for specific chemical compositions; (6) off-design analysis capability; (7) economic modeling subroutines; (8) extensive use of splines for accurate and quick numerical evaluations (e.g., steam tables are represented by cubic splines); (9) precompiled models, so that only one set of generic instructions is loaded into core for each unique model type; (10) total modularity; and (11) compactness (an abridged version has fit on a 64K microprocessor).

9762 (DOE/EIS—0105-D) Conversion to coal: Baltimore Gas and Electric Company, Brandon Shores Generating Station Units 1 and 2, Anne Arundel County, Maryland. Draft environmental impact statement. (USDOE Economic Regulatory Administration, Washington, DC. Office of Fuels Programs). Dec 1983. 234p. NTIS, PC A11/MF A01. Order Number DE84003359.

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The proposed action which is the subject of this Environmental Impact Statement is the issuance of final FUA Prohibition Orders to the Baltimore Gas and Electric Company (BG and E) for Brandon Shores Units 1 and 2. Proposed Prohibition Orders were issued for these units under FUA on October 9, 1979. BG and E elected continued coverage under FUA pursuant to the OBRA amendments on November 8, 1981. The Department of Energy has determined that issuance of a final prohibition for Brandon Shores would be a major Federal Action significantly affecting the quality of the human environment. This document also addresses certain non-federal actions. This EIS also addresses the effects that might occur when the Crane and Wagner units, through the conversion of the Crane Units or continued operation of the Wagner Units, share or compete with Brandon Shores Units for air, water, and solid-waste disposal resources. The major purposes of this statement are to: Ensure that appropriate consideration is given to environmental factors at all stages of DOE's decision-making process; reduce duplication between NEPA and state and local requirements by cooperation with state and local agencies to the fullest extent possible; provide information on the effect of the Federal Action so that it may be integrated into state and local planning processes; and identify and assess reasonable alternatives to the proposed action, including the no-action alternative, that will avoid or minimize adverse effects upon the human environment.

9763 (PB—84-101682) Water demand for generating electricity: a mathematical programming approach with application in Poland. Stone, J.C.; Singleton, F.D. Jr; Gadkowski, M.; Salewicz, A.; Sikorski, W. (International Inst. for Applied Systems Analysis, Laxenburg (Austria)). [nd]. 68p. NTIS, PC E04/MF E04.

The report documents a water demand study developed Section 1 of the report provides some background information and introduction. Section 2 is a nonmathematical description of the model. Section 3 describes in detail the principal options of plant design and operation, making extensive use of flow diagrams. Section 4 focuses on the use of the model, and includes a brief discussion of procedures for operating the model, its size, and computability.

9764 Coal conversion of the district heating power station in Vasteraas, Sweden. Johansson, E. (Vaesteras Stads Kraftvaermeverk AB, Sweden). pp 14p, Paper 5 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Before 1980 the Vasteraas District Heating Power Station was 100% dependent on oil supply from abroad, and all the district heating was based on oil. It was then decided to convert three of the four boilers into solid fuel firing, pulverized coal. In summer 1981 two boilers were commissioned on coal-firing. The third boiler will be commissioned in summer 1983. The experiences from the first conversion indicate that it is possible to convert a boiler without derating it. The slagging problems of these boilers can be handled with good steam sootblowing. Also the unburnt and the excess air levels can be kept at an acceptable level. The stack gas temperatures rise and have to be lowered in some way. Also the tightness of the air system before the boiler has to be modified, especially in the air heater and the windbox. The cost to convert is significantly lower than building a new boiler, and the investment is estimated to be repaid in 4 to 5 years.

2002 Environmental Aspects

REFER ALSO TO CITATION(S) 9269, 9270, 9271, 9272, 9273, 9274, 9275, 9276, 9282, 10488

9765 (KHM-TR—53) Basic pollutant emissions and their statistics of two coal fired boilers. Jantunen, M.J.; Itkonen, A.; Lihtamo, H.; Savolainen, T. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 68p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751379.

Portions are illegible in microfiche products; Summary in Swedish.

Two coal fired power plants - 47 MWt chain grate fired, multicyclone equipped (Myllypouro) and 300 MWt pulverized coal fired, electrostatic precipitator (ESP) equipped (Hanasaari) - were studied to determine the fluctuations in the basic emission components under normal operating conditions. The emissions of SO2 and

NO showed normal distributions and standard deviations in the order of 5-10 % of the mean for both plants. The mean emissions of SO2 were different due to different coal qualities, and the mean emission of NO was 50 % higher for Hanasaari. The mean emission of Co was 50 % higher for Myllypuro; it showed log-normal distribution with large geometric dispersion, while the CO-emission of Hanasaari was normally distributed with a modest standard deviation of 25 % of the mean. The size fractionated particulate emissions of Myllypuro were larger by a factor of 2.5 for $1.6 < dA < 15$ μm, 3.5 for $dA > 15$ μm, and 9.3 for $dA < 1.6$ μm particles. The average difference is 4.5-fold. These differences reflect the known properties of the two types of fly ash collectors, as well as the different of particulate emissions from two different types of furnaces. In Myllypuro the variation in particulate emissions increase with increasing particle size, but in Hanasaari the variation is about the same for all particle sizes, except the smallest. The particulate emissions of Hanasaari show a clear diurnal pattern. The plant is run to meet the municipal heat demand, and the electrostatic precipitator collection efficiency decreases with increasing flue gas flow. The results of this study suggest that data obtained from a short (a few hours) sampling program poorly reflect average long term emissions from the particular power plant.

2003 Power Transmission And Distribution

9766 **(DOE/AP/10041—T1) Southeast Alaska intertie dc transmission system: reconnaissance design and cost estimate. Appendix I.** (Teshmont Consultants, Inc., Winnipeg, Manitoba (Canada)). Nov 1982. Contract AC85-82AP10041. 289p. NTIS, PC A13/MF A01. Order Number DE84004096.

The detailed costs of the schemes are given in this Appendix. The conceptual designs of the sea electrodes for the schemes are also described. The cost estimates for the electrodes were based on these conceptual designs. A cost comparison of ac and dc transmission for 10 MW from Ketchikan to Tolstoi Bay is given along with an example outlining the procedure for selecting the optimum dc cable size.

9767 **(DOE/AP/10041—T2) Southeast Alaska intertie dc transmission system: reconnaissance design and cost estimate.** (Teshmont Consultants, Inc., Winnipeg, Manitoba (Canada)). Nov 1982. Contract AC85-82AP10041. 186p. NTIS, PC A09/MF A01. Order Number DE84004095.

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A study was made of the feasibility and economics of interconnecting a number of communities in Southeast Alaska utilizing dc submarine cables. The objective is to make it possible to utilize the hydroelectric power that is available in some areas to minimize fossil fuel generation in other areas and to supply hydroelectric power to a potential large mining load in eastern Southeast Alaska. A reconnaissance inspection was made of possible transmission line and cable routes and terminal sites. The first part of the work included a review of the load/resource analysis to determine whether the system configurations and capacities proposed by APA were engineeringly appropriate. Other items addressed included the suitability of dc transmission for this application, multiterminal aspects of dc transmission, performance of the dc system, reliability and operational flexibility of the system and operation and maintenance. Results are presented in a separate report. The second part of the work consisted of the costing of the transmission schemes and recommendations on the future activities that should be carried out for detailed cost estimates and designs prior to preparation of bid specifications. These aspects are described in detail in this report.

9768 **(DOE/CE/15102—T1-Pt.1) Windamper method of galloping control. Pt. I. Management overview. Final report.** Richardson, A.S. Jr. (Research Consulting Associates, Lexington, MA (USA)). 15 Oct 1983. Contract FG01-82CE15102. 29p. NTIS, PC A03/MF A01. Order Number DE84001433.

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The Management Overview provides an up-to-date assessment of the extent of the galloping problem (ice buildup on windward side of conductors) world-wide, presents evidence of Windamper's ability to effectively control galloping, and compares its performance with two other well-known methods. It appears that by all accounts and tests of quantitative data on the Windamper's performance it stands out as the best control method available.

9769 **(DOE/CE/15102—T1-Pt.2) Windamper method of galloping control. Pt. II. Prediction of dynamic galloping. Final report.** Richardson, A.S. Jr. (Research Consulting Associates, Lexington, MA (USA)). 15 Oct 1983. Contract FG01-82CE15102. 51p. NTIS, PC A04/MF A01. Order Number DE84003290.

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This has been a technical review and extension of the Windamper methodology for controlling galloping (ice buildup on windward side). The new material consists of three main parts. First, there is the review and analysis of single conductor by coupled two-degree-of-freedom analysis. Second, there is the extension of that method to the bundled conductor. Third, there is the report of the new Windamper aerodynamic data (Appendix). The analytical work supports the general hypothesis and theory of Den Hartog. The Windamper appears to act to stabilize conductors which would otherwise become unstable when lift slope is negative. When lift slope is positive, a flutter type of gallop may be identified, owing to lee-side location of the damper c.g. In single conductors, the realization of the flutter gallop requires very large positive lift slope, and the torsion component dominates the motion which also would limit gallop amplitude. In bundled conductors, the realization of the flutter gallop requires only small positive lift slope because of the proximity of the two natural frequencies to each other. Very little torsion is present in the bundle motion, and the Windamper aerodynamic drag produces a net flow of energy to damp the motion.

9770 **(TVA/OP/EDT—84/4) TVA's 500-kV electric and magnetic fields measurements and analyses. Final report.** Hilson, D.W. (Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology). Sep 1983. 248p. NTIS, PC A11/MF A01. Order Number DE84900617.

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This report summatizes the results of teh 500-kV electric and magnetic fields data project. The objectives of the project were to measure, record, and analyze electric and magnetic fields in the vicinity of TVA's 500-kV transmissionlines. This report contains the categorization and the statistical analysis of the fields data.

21 NUCLEAR POWER PLANTS

REFER ALSO TO CITATION(S) 9660

9771 **(NUREG—0020-Vol.7-No.10) Licensed operating reactors: status summary report, data as of September 30, 1983. Volume 7, No. 10.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Dec 1983. 411p. NTIS, PC A18/MF A01 - GPO. Order Number DE84900583.

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The three sections of the report are: monthly highlights and statistics for commercial operating units, and errata from previously reported data; a compilation of detailed information on each unit, provided by NRC's Regional Offices, IE Headquarters and the utilities; and an appendix for miscellaneous information such as spent fuel storage capability, reactor-years of experience and non-power reactors in the US.

2101 Power Reactors, Non-breeding, Light-water Moderated, Boiling Water Cooled

REFER ALSO TO CITATION(S) 9858, 9897, 9899, 9900, 9909, 9912, 9920

9772 (CONF-8209200—1) Analysis of cracked core spray piping from the Quad Cities Unit 2 boiling water reactor. Diercks, D.R.; Gaitonde, S.M. (Argonne National Lab., IL (USA); Commonwealth Edison Co., Maywood, IL (USA)). Sep 1982. Contract W-31-109-ENG-38. 12p. NTIS, PC A02/MF A01. Order Number DE84004029.

From ASM Canadian Council and Canadian Nuclear Society conference on materials in nuclear energy; Huntsville, Canada (29 Sep 1982).

The results of a metallurgical analysis of leaking cracks detected in the core spray injection piping of Commonwealth Edison Company's Quad Cities Unit 2 Boiling Water Reactor are described. The cracks were present in a welded 105° elbow assembly in the line, and were found to be caused by intergranular stress corrosion cracking associated with the probable presence of dissolved oxygen in the reactor cooling water and the presence of grain boundary sensitization and local residual stresses induced by welding. The failure is unusual in several respects, including the very large number of cracks (approximately 40) present in the failed component, the axial orientation of the cracks, and the fact that at least one crack completely penetrated a circumferential weld. Virtually all of the cracking occurred in forged material, and the microstructural evidence presented suggests that the orientation of the cracks was influenced by the presence of axially banded delta ferrite in the microstructure of the forged components.

9773 (DOE/ET/34031—15) BWR fuel bundle extended burnup program. Technical progress report, January 1982-December 1982. Baumgartner, J.A. (comp.). (General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.; Northern States Power Co., Minneapolis, MN (USA)). Sep 1983. Contract AC02-80ET34031. 53p. (GEAP—30268). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84005424.

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At the start of this period there were four fuel bundles operating to extended burnup in the Monticello Nuclear Generating plant. All four of these bundles successfully completed their planned extended burnup operation and were discharged in September 1982 at average burnups which ranged from 42.2 GWd/MTU to 45.6 GWd/MTU. Principal activities during this period were the completion of hot cell examination and testing of fuel and components from bundle MTB072 (33.8 GWd/MTU). Results obtained from each of the Program tasks are summarized.

9774 (PB—83-254664) Light-water reactors reference system classification for the European Reliability Data System (ERDS). Melis, M.; Mancini, G. (Commission of the European Communities, Luxembourg). [nd]. 267p. (EUR—7905-EN). NTIS, PC E11/MF E11.

The reference system classification represents a basic stage in the organization of the European Reliability Data System (ERDS) for light-water reactors, a project under development at the Joint Research Centre, Ispra. The project is concerned with operational reliability data collection from the various 'national' data banks, and centralization in a European reliability data system, so improving the significance of the resulting reliability evaluations. Within the framework of the ERDS project, the reference system classification provides an LWR functional break-down and represents a plant-unique identification in the process of homogenization of event-data coming from the various 'national' organizations. After a brief description of the main objectives of the ERDS project, the criteria followed in the development of the reference system classification are reviewed and the detailed classification is presented. (Copyright (c) ECSC-EEC-EAEC, Brussels Luxembourg, 1982.)

9775 (RISO-R—474) Determination of local pin powers in the framework of nodal coarse-mesh solutions. Nissen, F. (Risoe National Lab., Roskilde (Denmark)). Aug 1982. 144p. NTIS (US Sales Only), PC A07/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark. Order Number DE83704570.

Several methods are described of regaining the information on local properties of single heterogeneous subassemblies after the three-dimensional coarse-mesh solution has been found. The efficiency and accuracy of these methods are determined by testing them on three benchmark problems. Finally, new homogenization methods are described that are capable of accurately predicting average values of boundary fluxes and currents.

9776 (SKI-B—61-81) Thermal fatigue of the T-pieces of feed water tubes. Eriksson, H. (Statens Kaernkraftinspektion, Stockholm (Sweden)). Jun 1982. 80p. (In Swedish, English, German). (SA—895482). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704537.

The report covers a survey of current research, a literature study and an account of visits to research laboratories. Considerable efforts to deal with thermal fatigue cracks in BWR water conditions have been accomplished by ASEA-ATOM. Future planning is presented.

9777 (STUDSVIK-NF(P)—82-72) Experimental study of defect power reactor fuel. Final report. Forsyth, R.S.; Jonsson, T. (Studsvik Energiteknik AB, Nykoeping (Sweden)). 14 Dec 1982. 83p. (SKI-B—3-81; SKI-B—30-82). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704575.

Two BWR fuel rods, one intact and one defect, with the same manufacturing and irradiation data have been examined in a comparative study. The defect rod has been irradiated in a defect condition during approximately one reactor cycle and has consequently some secondary defects. The defect rod has two penetrating defects at a distance of about 1.5 meters from each other. Comparison with the intact rod shows a large Cs loss from the defect rod, especially between the cladding defects, where the loss is measured to about 30 %. The leachibility in deionized water is higher for Cs, U and Cm for fuel from the defect rod. The leaching results are more complex for Sr-90, Pu and Am. The fuel in the defect rod has undergone a change of structure with gain growth and formation of oriented fuel structure. The cladding of the defect rod is hydrided locally in some parts of the lower part of the rod and furthermore over a more extended region near the end of the rod.

9778 Stress-corrosion cracking in light-water reactors. Berry, W.E. (Battelle Columbus Laboratories, Columbus, OH). *American Society of Mechanical Engineers, Pressure Vessels and Piping Division, [Technical Report] PVP;* **PVP-VOL. 71**: 217-230(1983). (CONF-830607—).

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

Chloride- and caustic-stress corrosion cracking (SCC) of austenitic stainless steels were detected in steam generators during initial operation of prototypes and the first commercial pressurized-water reactor (PWR) power plant. Accordingly, harmful chloride and caustic conditions have been avoided in light water nuclear power plants on both the primary and secondary coolant sides of the systems. However, occasional SCC has continued to occur in steam generator tubing in PWR's and also in piping in the relatively pure water of boiling-water reactors (BWR's). This paper presents a brief summary of the SCC experienced in the two types of reactors, describes the contributing causes, and reviews the remedial measures that have been proposed.

9779 **Sonderforschungsbereich 157 der Universitaet Stuttgart. Zwischenbericht. (Requirement of nuclear data and inaccuracy of nuclear data in evaluating the target values of shielding calculations for the light water reactor and the high-temperature reactor).** Kicherer, G.; Hehn, G. (Stuttgart Univ. (Germany, F.R.). Inst. fuer Kernenergetik und Energiesysteme). Stuttgart, Germany, F.R.; Stuttgart University (1982). 109p. (In German). Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

This study tries to investigate for the first time systematically and quantitatively the influence on the prediction of reactor shieldings from inaccuracies in nuclear data playing an essential part in design, monitoring, and estimation of the useful life of power reactors. The main objective is to calculate the contribution of the error in nuclear data to the inaccuracy of the targets of reactor shielding calculations expressed in terms of radiation dose, radiation damages and radiation heat, that have got a high safety relevance. As a result, it can be determined if there remains a sufficiently large margin for the errors from the mathematical method and the geometrical approximation. In the first part of the paper the most important international nuclear data libraries are compared by means of a one-dimensional shielding calculation for the BWR KRB II. In the second part a systematic sensitivity study for the shielding targets of a BWR (KRB II/1300 MWsub(el)) and a HTGR (THTR-300/300 MWsub(el)) is performed for the cross-section data of the individual nuclides. In relation with the evaluated nuclear data errors and the result of the sensitivity study the error in the nuclear data used for the prediction of the radiation damage to the RPV or liner respectively and of the radiation dose in the concrete of the primary shield can be analyzed for light water and high-temperature

2102 Power Reactors, Non-breeding, Light-water Moderated, Non-boiling Water Cooled

REFER ALSO TO CITATION(S) 9518, 9774, 9778, 9872, 9873, 9875, 9877, 9887, 9890, 9898, 9901, 9902, 9903, 9908, 9909, 9914, 9920, 9921, 9940, 10217

9780 **(BNL-NUREG—33897) Boron injection at natural circulation conditions in PWRs.** Perkins, K.R. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 13p. (CONF-830901—22). NTIS, PC A02/MF A01 - GPO. Order Number DE84004287.

From Anticipated and abnormal plant transients in light water reactors conference; Jackson, WY, USA (26 Sep 1983).

Combustion Engineering has performed a boron injection test at San Onofre Unit 2 to demonstrate the ability to borate to the cold shutdown concentration at natural circulation conditions. The test was run in July 1983 and it has been analyzed with the BITRAN code developed at BNL. The test results will demonstrate injection and cooldown capability and provide data for validating boron transport and mixing models. Extrapolation of the test to more severe emergency conditions indicates oscillations in boron concentration which are predicting to decay within one hour after injection.

9781 **(CEA-CONF—6750) Flow-induced vibration of steam generator tube bundles.** Gibert, R.J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jul 1983. 29p. (In French). (CONF-8306149—2). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750321.

From French-Soviet seminar on PWR steam-generators; Moscow, USSR (27 Jun 1983).

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The vibrations induced in tube arrays by a transversal flow are of great practical interest because of their destructive effects especially on heat exchangers. Instabilities can appear beyond a critical flow velocity and induce very high vibratory levels which may involve fractures. These instabilities involve a fluidelastic coupling between the vibratory movement of the tubes and the flow round them. Studies are being carried out in France concerning steam generators. A lot of bundle mock-ups with various pitches have been tested and large range parameter domains have been investigated. In a second part, the C.E.A., FRAMATOME, E.D.F. and WESTINGHOUSE research program, which is being carried out, is presented.

9782 **(CEA-CONF—6751) Mechanical stresses of PWR steam generators and particularly of the bundle of U tubes.** Verdeau, J.J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jul 1983. 13p. (In French). (CONF-8306149—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750320.

From French-Soviet seminar on PWR steam-generators; Moscow, USSR (27 Jun 1983).

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The different mechanical stresses are briefly reviewed; supports allow to resist to them. In spite of the internal supports of the U tubes, the secondary flow induce vibrations. Tests are carried out to forecast the wear of the tubes.

9783 **(CEA-CONF—6785) Vibration signature of PWR internal structures in various abnormal conditions.** Epstein, A.; Assedo, R.; Puyal, C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 11p. (CONF-8305156—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750327.

From 16. informal meeting on reactor noise; Budapest, Hungary (18 May 1983).

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The SAFRAN test loop consists of an hydroelastic model at 1/8 scale of a three loop PWR. This facility has been used for various vibrational studies concerning the main internal structures. In particular, an experimental program has been devoted to the abnormal vibratory behaviour of the hold down spring. In the present paper, a synthesis is given based on the whole of obtained experimental data. In particular, new results are discussed for various contact conditions between the low part of the core barrel and the vessel. It is verified that the vibration signatures of the internals are very sensitive, both to the hold down spring status and to the contact conditions.

9784 **(CEA-CONF—6797) Radiographic inspection of PWR safe end welds.** Destribats, M.T.; Loizelet, R.; Papezyk, F.; Rattoni, B. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 5p. (In French). (CONF-8305152—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750263.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

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During statutory inspections of PWR vessels a radiographic control on the welds of the safe ends (primary tubing - vessel connection) is required. A special device has been made to perform reliable, reproductible radiographics under 20 metres of water.

9785 **(PB—83-248872) Experimental study of the tritium inventory in the BR3 and extrapolation to a P.W.R. of 900 MWe. Final report.** Charlier, A.; Cubel, P.; Vandenberg, C.; Haas, D. (Commission of the European Communities, Luxembourg). [nd]. 48p. (EUR—8183-EN). NTIS, PC E03/MF E03.

The tritium production and diffusion in uranium and plutonium fuel in the primary circuit of a PWR was evaluated and the production difference between the two kinds of isotopes was investigated. The first part of the work was related to the experimental PWR BR3, cycle 4A, during which constant control of the tritium activity was maintained in the primary circuit. The second part of the work was devoted to post-irradiation examinations of uranium and plutonium rods irradiated in the BR3 reactor. In the last part of the work, the tritium production in a PWR of 900 MWe under operating conditions was calculated for an uranium fuelled core and for a core containing 30% of plutonium fuel assemblies.

9786 **(SKI-B—13-82) Study of methods for testing the tubes of steam generators by means of Eddy Current.** Oehnfeldt, C.-G. (Statens Kaernkraftinspektion, Stockholm (Sweden)). 20 Sep 1982. 31p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704577.

Comparative studies of equipment have been performed at Ringhals. Automatic testing systems, type Vincotte have been found to be flexible. Multi-frequency systems are to be preferred. The limits of detection of defects can be estimated in three classes including defects which are impossible to detect. Real defects in Ringhals-2 and Ringhals-3 were used as reference.

9787 **Fracture mechanics data deduced from thermal-shock and related experiments with PWR pressure vessel material.** Cheverton, R.D.; Bolt, S.E.; Canonico, D.A.; Holz, P.P.; Iskander, S.K.; Nanstad, R.K.; Stelzman, W.J. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Journal of Pressure Vessel Technology;* **105**: No. 2, 102-110(May 1983). Contract W-7405-ENG-26.

Thermal-shock experiments with steel cylinders have been conducted at ORNL to investigate the behavior of long axial inner-surface flaws during loading conditions similar to those imposed by a PWR LOCA. The scope of the three most recent experiments was dictated by results of the PWR-LOCA fracture-mechanics analysis and included: initiation and arrest of shallow and deep flaws, a series of initiation-arrest events with deep penetration of the wall, long crack jumps, arrest in a rising K_I field, and warm prestressing. For the purpose of designing the experiments and evaluating their results, the static initiation and arrest toughness curves were determined for the test cylinders, and this was done using compact specimens. The experiments demonstrated WPS and arrest in a rising K_I field and indicated that LEFM is valid for thermal-shock loading.

2103 Power Reactors, Non-breeding, Graphite Moderated

REFER ALSO TO CITATION(S) 9779, 9848, 9849, 9857, 9904, 9905, 9906, 9907, 9911, 9939, 10244, 10245, 10277

9788 **(CEA-CONF—6697) Results of and prospects for studies on molten salt nuclear reactors.** Hery, M.; Lecocq, A. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Apr 1983. 7p. (In French, English). (CONF-830427—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750290.

From 1. international symposium on molten salt chemical and technical; Kyoto, Japan (20 Apr 1983).

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This paper reviews the various studies performed in France by the EDF and CEA teams in the field of molten salt nuclear reactors. These studies include graphite moderating systems, feasibility of a 625 MWth core, lead cooling, structural materials, salts tritium diffusion and corrosion. The experience gained allows eventual development prospects of this system to appraised.

9789 **(CEA-CONF—6698) Studies of materials for molten salt nuclear applications.** Sannier, J.; Santarini, G. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Apr 1983. 4p. (CONF-830427—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750291.

From 1. international symposium on molten salt chemical and technical; Kyoto, Japan (20 Apr 1983).

This paper presents a set of experiments aimed at an evaluation of the behaviour of different materials in contact with liquid or solid media likely to be encountered in a molten salt nuclear reactor. Operation of a molten fluoride loop made of graphite is described. Tests are undertaken for the study of steel corrosion by fluorides or liquid lead and molten fluorides. Metal and carbon transfers in a mixture of molten fluorides are evidenced. Tests show that steel is wetted preferentially by lead and not by molten fluorides thus avoiding salt deposition in the heat exchanger.

9790 **(CEGB-TPRD/B—0016/N82) COPDIRC - calculation of particle deposition in reactor coolants.** Reeks, M.W. (Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.). Jun 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704579.

A description is given of a computer code COPDIRC intended for the calculation of the deposition of particulate onto smooth perfectly sticky surfaces in a gas cooled reactor coolant. The deposition is assumed to be limited by transport in the boundary layer adjacent to the depositing surface. This implies that the deposition velocity normalised with respect to the local friction velocity, is an almost universal function of the normalised particle relaxation time. Deposition is assumed similar to deposition in an equivalent smooth perfectly absorbing pipe. The deposition is calculated using 2 models.

9791 (NUREG/CP—0045-Vol.2, pp 297-312) **Predictive testing of performance of metals in HTR service environments.** Kondo, T.; Shindo, M.; Tamura, M.; Tsuji, H.; Kurata, Y.; Tsukada, T. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Status of the material testing in simulated HTGR environment is reviewed with special attention focused on the methodology of the prediction of performance in long time. Importance of controlling effective chemical potentials relations in the material-environmental interface is stressed in regard of the complex inter-dependent kinetic relation between oxidation and carbon transport. Based on the recent experimental observations, proposals are made to establish some procedures for conservative prediction of the metal performance.

9792 (NUREG/CP—0045-Vol.2, pp 334-344) **Study of creep collapse of tubes subject to external pressure at elevated temperature.** Takikawa, N. (Kawasaki Heavy Industries, Ltd., Tokyo, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Intermediate heat exchanger (IHX) tubes of VHTR form the boundary between the primary and secondary coolants of the reactor. The tubes are subject to external pressures at a postulated secondary coolant depressurization accident, which might lead to creep collapse. Therefore, it is necessary to ensure the integrity against creep collapse by analysis. The objective of this work is to study a simplified analytical method for predicting collapse time of a curved tube subjected to an external pressure. The study is made based on the comparison of experimental collapse time of curved and straight tubes. Creep collapse tests were conducted under an elevated temperature and an external pressure. Test results showed that curved tubes had longer collapse time than straight tubes with the same cross sectional ovality. The simplified analytical method for a curved tube is proposed in this report, which is to compute collapse time of a straight tube with the same ovality. And in this method the computed time is considered as collapse time of the curved tube. The above test results show that this simplified method gives the conservative collapse time. And it is confirmed by additional IHX tube tests that the method is applicable to creep collapse analysis of IHX tubes.

9793 (NUREG/CP—0045-Vol.2, pp 345-363) **Long term creep behavior of Incoloy 800H and Hastelloy X in simulated HTGR environments.** Lee, K.S.; Chow, J.G.Y.; Gerlach, L. (Brookhaven National Lab., Upton, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Creep rupture tests on Incoloy 800H and Hastelloy X had been carried out in simulated steam-cycle HTGR helium environments for two levels of moisture. The wet helium studies have been completed for a maximum test time of 16,000 hours; the dry helium tests are still in progress with a maximum test time of 18,000 hours. Standard air tests have been running for over 35,000 hours. The creep rupture behavior of Incoloy 800H in the wet helium is not significantly different from that in air but the dry helium increases the rupture life. Hastelloy X shows a slightly lower rupture life in the wet helium while the dry helium improves the creep properties in comparison with standard air tests. Oxidation is the major gas-metal interaction in both helium environments.

9794 (NUREG/CP—0045-Vol.2, pp 364-374) **Creep properties of Hastelloy X in a carburizing helium environment.** Nakanishi, T.; Kawakami, H. (Fuji Electric Corporate Research and Development, Ltd., Yokosuka, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

In this work, we investigate the environmental effect on the creep behavior of Hastelloy X at 900°C in helium and air. Since helium coolant in HTGR is expected to be carburizing and very weakly oxidizing for most metals, testings were focused on the effect of carburizing and slight oxidation. Carburization decreases secondary creep strain rate and delays tertiary creep initiation. On the other hand, the crack growth rate on the specimen surface is enhanced due to very weak oxidation in helium, therefore the tertiary creep strain rate becomes larger than that in air. The rupture time of Hastelloy X was shorter in helium when compared with in air. Stress versus rupture time curves for both environments do not deviate with each other during up to 5000 hours test, and a ratio of rupture stress in helium to that in air was about 0.9.

9795 (NUREG/CP—0045-Vol.2, pp 375-381) **Long-term creep testing of 2 1/4 Cr-1 Mo steel in HTGR helium.** Rittenhouse, P.L.; McCoy, H.E. (Oak Ridge National Lab., TN). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2). Contract W-7405-ENG-26.

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Long-term creep tests have been conducted on three heats of 2 1/4 Cr-1 Mo ferritic steel, a candidate alloy for a number of applications in gas-cooled reactors. These tests, run at temperatures from 482 to 649°C, have reached times of 40,000 h and greater. Essentially no effect of environment, either air or simulated gas-cooled reactor helium, was seen at temperatures up to about 600°C. At the highest test temperature; the creep behavior of the steel was degraded both by oxidation in air (fall off in creep resistance and lower creep ductility) and decarburization in gas-cooled reactor helium (lower creep resistance).

9796 (NUREG/CP—0045-Vol.2, pp 382-392) **Toughness degradation of 2 1/4Cr-1Mo steel caused by isothermal ageing, stress ageing and neutron irradiation.** Oku, T.; Suzuki, M.; Fukaya, K.; Kodaira, T. (Japan Atomic Energy Research Inst., Ibaraki-Ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Investigations on the toughness degradation of 2 1/4Cr-1Mo steels caused by the isothermal ageing, stress ageing and neutron irradiation are done in order to evaluate the integrity of the structural components such as the pressure vessel of the experimental VHTR. The effects of copper and phosphorus on such embrittlements are investigated using several 2 1/4Cr-1Mo steels with different amounts of copper and phosphorus. The evaluation of embrittlement is mainly made by the Charpy impact test. The steel containing 100 ppM phosphorus shows that the applied stress enhances the embrittlement due to thermal ageing at 450°. It is also clarified that the steel with 50 ppM phosphorus does not show any toughness degradation by the stress ageing as well as thermal ageing. Besides, 2 1/4Cr-1Mo steels with less than 100 ppM phosphorus and 0.1% copper have the low susceptibility to the neutron irradiation embrittlement around the operation temperature of the experimental VHTR.

9797 (NUREG/CP—0045-Vol.2, pp 393-420) **Effects of HTGR helium on the high cycle fatigue of structural materials.** Soo, P.; Sabatini, R.L.; Gerlach, L. (Brookhaven National Lab., Upton, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

High cycle fatigue tests have been conducted on Incoloy 800H and Hastelloy X in air and in HTGR helium environments containing low and high levels of moisture. For the helium environments, a higher mositure level usually gives a lower fatigue strength. For air, however, the strength is usually much lower than those for helium. For long test times at higher test temperatures, the fatigue strengths for Incoloy 800H often show a large decrease, and the fatigue limits are much lower than those anticipated from low cycle tests. Optical and scanning electron microscope observations were made to correlate fatigue life with surface and bulk microstructural changes in the material during test. Oxide scale cracking and spallation, surface recrystallization and intergranular attack appear to contribute to losses in fatigue strength.

9798 (NUREG/CP—0045-Vol.2, pp 421-432) **Effect of HTGR helium on fatigue and creep properties of 2 1/4Cr-1Mo steel.** Kurumaji, T. (Babcock-Hitachi K.K. Kure Research Lab., Hiroshima-ken, Japan); Yamazaki, H.; Kudo, A. 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Low cycle fatigue and creep tests have been carried out on 2 1/4Cr-1Mo steel (candidate steel for VHTR reactor pressure vessel) in helium environment containing 200 ~ 300 μatm of H_2, 100 ~ 150 μatm CO, 7 ~ 10 μatm CH_4, 7 ~ 10 μatm CO_2 and 1 μatm H_2O (JAERI B Helium). Fatigue life in helium environment was longer than that in air at 450°C. This results can be explained by supposing that oxidation at the crack tip causes the wedge effect to promote crack propagation in air. On the otherhand, creep rupture strength showed no significant difference in both helium and air. Equivalent creep rupture strength in both helium and air may be due to the fact that detrimental internal oxidation and carburization or decarburization hardly occur at 400 ~ 450°C.

9799 (NUREG/CP—0045-Vol.2, pp 433-468) **Effect of simulated HTGR primary circuit helium on properties of structural alloys.** Ellis, R.A.; Cuturilo, J.H.; Kimball, O.F. (General Electric Co., Schenectady, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2). Contract AC02-76ET34202.

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The effect of exposure to simulated HTGR primary circuit helium (400 μatm H_2/2 μatm H_2O/40 μatm CO/0.2 μ atm CO_2/20 μatm CH_4 in He at 2 atm total pressure) on the properties of structural alloys is studied over the temperature range of 750 to 1050°C (1382 to 1922°F). Creep-rupture testing is being performed using both single specimen and multispecimen equipment. Specimens are also being exposed unstressed for post-exposure evaluation of oxidation, thermal aging effects and carburization and for evaluating changes in tensile, impact and fatigue properties due to exposure. Some air tests are being performed for comparison. The results to date (exposure times to approximately 10,000 hours) are discussed for a variety of wrought iron- and nickel-based austentic alloys, cast nickel-based alloys, and oxide dispersion strengthened alloys. It generally appears that the environmental effect is significant only in the highest temperature range: thermal aging appears to be the cause of most of the changes seen during lower temperature exposures accomplished to date.

9800 (NUREG/CP—0045-Vol.2, pp 469-478) **Grain boundary precipitation treatment for improving high temperature low cycle fatigue strength of SSS113M for VHTR.** Watanabe, R. (Hitachi, Metals, Ltd., Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Grain boundary precipitation treatment was studied for the purpose of improving high temperature low cycle fatigue strength of a Ni-23% Cr-18% W alloy. SSS113M which had been developed as an intermediate heat exchanger material of VHTR and recognized as the best alloy in the national research project concerning nuclear steelmaking in Japan. Conventional single solid solution treatment of 1300°C x 1h W.Q. does not cause any massive grain boundary precipitation in SSS113M, but additional heat treatment of 1250°C x 1h W.Q. causes discontinuous grain boundary precipi-

tation of α.W phase. This grain boundary precipitation treatment results in two- to fivefold increase of low cycle fatigue strength at 800°C as well as slightly higher creep and stress rupture strength at 1000°C.

9801 (NUREG/CP—0045-Vol.2, pp 479-499) **Graphite oxidation in HTGR atmosphere.** Growcock, F.B.; Barry, J.J.; Finfrock, C.C.; Rivera, E.; Heiser, J.H. III. (Brookhaven National Lab., Upton, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

On-going and recently completed studies of the effect of thermal oxidation on the structural integrity of HTGR candidate graphites are described, and some results are presented and discussed. This work includes the study of graphite properties which may play decisive roles in the graphites' resistance to oxidation and fracture: pore size distribution, specific surface area and impurity distribution. Studies of strength loss mechanisms in addition to normal oxidation are described. Emphasis is placed on investigations of the gas permeability of HTGR graphites and the surface burnoff phenomenon observed during recent density profile measurements. The recently completed studies of catalytic pitting and the effects of prestress and stress on reactivity and ultimate strength are also discussed.

9802 (NUREG/CP—0045-Vol.2, pp 500-515) **Studies on mechanical properties of graphites for HTGR.** Oku, T.; Eto, M.; Fujisaki, K.; Yoda, S.; Ishiyama, S.; Sugihara, T. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Recent research on the mechanical properties of HTGR graphites at JAERI is reviewed. The mechanical properties of graphites are required for predicting the stresses induced in the core graphite structures during reactor operation and for evaluating non-failure probabilities of the graphite structures. In this paper, effects of irradiation, stress and oxidation on the mechanical properties and fatigue properties of petroleum coke semi-isotropic and isotropic graphites for HTGRs are primarly described. Young's modulus and bend strength before and after neutron irradiation have been measured to examine irradiation effects on a fracture criterion of graphites. Two kinds of relationships are found between the bend strength and Young's modulus, depending upon the irradiation temperature. Changes in Young's modulus after irradiation are found to be different from those after irradiation creep deformation. Young's modulus under compressive stress is equivalent to that at the onset of unloading. Oxidation gives rise to the decreases in density and modulus, and also brings about a strength degradation. Tension-compression fatigue strengths are obtained and arranged successfully using statistical trivariant method with tension-tension fatigue strength data.

9803 (NUREG/CP—0045-Vol.2, pp 516-526) **Feasibility study of thermal insulation materials for core support of experimental VHTR.** Kawakami, H.; Nakanishi, T. (Fuji Electric Corporate Research and Development, Ltd., Yokosuka, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Thermal insulation materials for core support of the experimental VHTR, planned by JAERI, should maintain moderate compressive strength and dimensional stability as well as low thermal conductivity at the maximum service temperature of 1100°C for 20 years. For selecting materials, we investigate properties of some candidates, and evaluate their feasibility. Preliminary tests, heat treatment test and compressive creep tests for 1000 hours at 900°C and 1000°C were conducted. In the preliminary tests, EG-38B (carbon baked at 1350°C) and Fine Finnex 600 (silicon nitride) showed acceptable physical stability. In the heat treatment tests, silicon nitride showed weight loss probably caused by thermal decomposition. Compressive creep deformation of Fine Finnex 600 was negligible under stress of 100 kg/cm^2 for 1000 hours. Heat treatment at 1200 to 1300°C for 50 hours improved dimensional stability of carbon at 1000°C.

9804 (NUREG/CP—0045-Vol.2, pp 563-573) **In-pile release behavior of gaseous fission product from VHTR fuel.** Fukuda, K.; Ogawa, T; Ikawa, K.; Yamamoto, K. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Loose TRISO coated fuel particles and compacts fabricated under VHTR design were irradiated by the sweep gas capsules and the in-pile release behavior of gaseous fission products was studied. By the release from the intact fuel the activation energies of the release and the diffusion coefficients of krypton in the pyrocarbon layer were estimated. The relation between release and uranium contamination, and the release mechanism depending on the release level were made clear in the releases from both the intact and the failed fuels. Failure fraction of the loose coated fuel particles was estimated and the retention of the fission gas in the matrix was recognized by analysis of the release from the fuels containing the failed coated fuel particles.

9805 (NUREG/CP—0045-Vol.2, pp 587-593) **Fission product plateout measurement in OGL-1.** Tsuyuzaki, N. (Japan Atomic Energy Research Inst., Ibaraki); Baba, O.; Goto, I.; Saito, T.; Yamamoto, K.; Sagawa, H.; Tanaka, I.; Itami, H.; Saruta, T.; Akutsu, C. 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The coated particle fuels for VHTR are being irradiated in the Japan Materials Testing Reactor where the fission products (FP) from the fuels and the activated nuclides from structural materials circulate and deposit on the inner wall. Authors have measured the FP plate-out distribution in the primary pipe by an in-situ non-destructive method developed in JAERI. Measured nuclides were ^{131}I, ^{137}Cs, ^{110}Ag, ^{54}Mn, ^{60}Co. After irradiation of four different fuel specimens, ^{137}Cs was mainly detected in higher temperature region than 600°C and ^{131}I in lower temperature region than 300°C for all fuels. A part of primary pipe at low temperature (~ 160°C) was cut and decontamination factors for ^{137}Cs and ^{131}I in the pipe were measured by washing with water and leaching with acid solution at room temperature.

9806 (NUREG/CP—0045-Vol.2, pp 610-619) **Analytical study of stress and deformation of HTR fuel blocks.** Tanaka, M. (Mitsubishi Heavy Industries, Ltd., Nagasaki-shi, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

A two-dimensional finite element computer code named HANS-GR has been developed to predict the mechanical behavior of the graphite fuel blocks with realistic material properties and core environment. When graphite material is exposed to high temperature and fast neutron flux of high density, strains arise due to thermal expansion, irradiation-induced shrinkage and creep. Thus stresses and distortions are induced in the fuel block in which there are spatial variation of these strains. The analytical method used in the program to predcit these induced stresses and distortions by finite element method is discussed. In order to illustrate the versatility of the computer code, numerical results of two example analyses of the multi-hole type fuel elements in the VHTR Reactor are given. Two example analyses presented are those concerning the stresses in fuel blocks with control rod holes and distortions of the fuel blocks at the periphery of the reactor core. It is considered these phenomena should be carefully examined when the multi-hole type fuel elements are applied to VHTR. It is assured that the predicted mechanical behavior of the graphite components is strongly dependent on the material properties used and obtaining the reliable material property is important to make the analytical prediction a reliable one.

9807 (NUREG/CP—0045-Vol.2, pp 620-636) **Thermal stress analysis of a Fort St. Vrain core support block under accident conditions.** Carruthers, L.M.; Butler, T.A.; Anderson, C.A. (Los Alamos National Lab., NM). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

A thermoelastic stress analysis of a graphite core support block in the Fort St. Vrain High Temperature Gas Cooled Reactor is described. The support block is subjected to thermal stresses caused by a loss of forced circulation accident of the reactor system. Two- and three-dimensional finite element models of the core suport block are analyzed using the ADINAT and ADINA codes, and results are given that verify the integrity of this structural component under the given accident condition.

9808 (NUREG/CP—0045-Vol.2, pp 637-643) **Bowing test of HTGR graphite sleeve - out of pile heating experiment.** Oku, T.; Eto, M.; Fujisaki, K.; Yoda, S. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

For the purpose of measuring the bowing of HTGR graphite sleeves caused by the temperature difference along their circumferential direction, a special rig was devised. It is equipped with a graphite heater which is located in a chamber to heat only one side of specimen along the longitudinal axis either in inert atmospheres or in vacuum up to temperatures 800 to 1000°C. An example of the results indicates that a temperature difference of approximately 170°C exerted along the circumferential direction lead to displacement due to bowing of hollow tube with consideration of the elongation caused by heating. The calculated value agrees fairly well with the one obtained from the experiment.

9809 (NUREG/CP—0045-Vol.2, pp 644-654) **Effects of the core flow distribution on the thermal stress of the fuel block.** Hayakawa, H. (Fuji Electric Co., Ltd., Tokyo, Japan); Ide, A.; Kubo, H.; Miyamoto, Y.; Arai, T.; Fumizawa, M. 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The pin-in-block type of fuel element is used in the experimental VHTR. The thermal stresses in this type of fuel element are caused by the temperature difference in the fuel channels, radiation heating in the block, the difference of the coolant temperatures between the fuel channel and the inter-column gap, etc. The relations between the thermal stress and the thermal boundary condition of the fuel block are studied, and the effects of the core flow distribution on them are surveyed. The following are shown by this study: (1) The thermal stresses due to the temperature difference in the fuel channels and radiation heating are small. (2) The thermal stress of the fuel block is mainly determined by the difference of the coolant temperatures between the fuel channel and the inter-column gap. (3) Therefore, the thermal stress of the fuel block is affected markedly by the core flow distribution.

9810 (NUREG/CP—0045-Vol.2, pp 655-668) **Inelastic stress analysis of the IHX tube sheet.** Muto, Y.; Suzuki, K. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The design of intermediate heat exchanger tube sheets of the VHTR Reactor requires serious attention. Its complicated shape causes significantly high thermal stresses at startup and shutdown, which requires the structural design be made by inelastic analysis rather than elastic analysis. A creep constitutive equation of Hastelloy X was therefore prepared based on literature data. Stress analysis and creep damage evaluation, made for flat and manifold tube sheets by finite element method, showed the structural life of the manifold type to be longer than that of the flat one. In addition, sensitivity analysis of the equation was performed in order to evaluate the influence of the dispersion in the data on the structural life.

2105 Power Reactors, Breeding

REFER ALSO TO CITATION(S) 9853, 9862, 9878, 9882, 9884, 9922, 9923, 9924, 9925, 9926, 9927, 9928, 9929, 9930, 9931, 9932, 9934, 9935, 9936, 9937, 9938, 10209, 10214, 10216, 10225, 10755

9811 **(AEEW-R—1561) Standards for maintenance documentation of COSMOS programs.** Burstall, R.F.; Rickets, T.M.; Butland, A.T.D. (UKAEA Atomic Energy Establishment, Winfrith). Jun 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704567.

The Compatible Open Shop Modular Operating Scheme (COSMOS) is used for fast reactor neutronics and subassembly distortion calculations in the UK. It provides database and databank facilities for this purpose. A large number of applications programs use these facilities. This report sets down the standards agreed for use in the preparation of maintenance documents for these programs. These standards have been developed as the result of experience with earlier more complicated standards. Some of the terminology used in this report is particular to COSMOS, but the general features of the standard may be useful to those responsible for other computer programs.

9812 **(BNL—33926) Accelerator breeders: will they replace liquid metal fast breeders.** Grand, P.; Powell, J.R.; Steinberg, M.; Takahashi, H. (Brookhaven National Lab., Upton, NY (USA)). Jun 1983. Contract AC02-76CH00016. 26p. (CONF-830660—4). NTIS, PC A03/MF A01. Order Number DE84004291.

From 23. annual international conference of Canadian Nuclear Association; Montreal, Canada (12 Jun 1983).

Investigation of accelerator breeders at Brookhaven National Laboratory indicate that the AB-LWR fuel cycle is economically competitive with the LMFBR fuel cycle. The same can be said about the accelerator breeder-High Temperature Gas Reactor symbiosis. This system appears to be very competitive with the added real advantage of superior safety and proliferation resistance. This discussion would be incomplete if the real competitor to accelerator breeding was not mentioned, namely Fusion Hybrid Breeding (FHB). Fusion Hybrid Breeding is a nearer option than pure fusion, as the breakeven Q value requirements are much more modest. Fusion Hybrid Breeding, if successful and practical, has the potential for highly efficient fissile fuel breeding, leading to cheaper fuel. The system, however, has yet to be demonstrated scientifically and to be shown commercially feasible. This is in contrast with the AB system which is an extension of proven, state-of-the-art technology with implementation possible within twenty years. 25 references, 4 figures, 5 tables.

9813 **(CEA-CONF—6724) Influence of various stresses on diametral and axial plastic deformations of the Phenix reactor fuel cans.** Guerin, Y.; Boutard, J.L. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France); CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 16p. (In French). (CONF-830418—12). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750279.

From International conference on dimensional stability and mechanical behavior of irradiated metals and alloys; Brighton, UK (11 Apr 1983).

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Dimensions of fuel cans are modified during irradiation in fast reactors: diameter increase is produced by steel swelling and irradiation creep under the pressure of fission gases and length increase integrates swelling. Diameter and density measured on fuel cans in SS 316, irradiated in the Phenix reactor, show that interaction spacer-can and interaction between pins produce plastic deformations. The interaction spacer-can leads not only to a helical deflection of the pin but also a slight axial plastic compression associated to a diametral plastic deformation. There is also a leveling of elongation in these strained pins because of friction with neighbouring pins.

9814 (CEA-CONF—6734) Acoustic methods in sodium flow for characterising pump cavitation and noise erosion correlations. Courbiere, E.; Defaucheux, J.; Garnaud, P. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Nov 1982. 11p. (DRNR-P—230; CONF-821101—23). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750317.

From ASME winter annual meeting (Engineering applications of laser velocimetry/published in ASME Jr. Fluid Engineering); Phoenix, AZ, USA (14 Nov 1982).

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Under the terms of agreements between the CEA and Jeumont-Schneider on fast breeder reactor sodium pumps, joint preliminary water mockup tests were carried out at the Jeumont facility. Similar experiments were carried out on the Superphenix primary sodium pumps during water testings at the EDF facility in Gennevilliers. The purpose of these tests was to define acoustic criteria for pump cavitation and to study the similitude between the mockup and the actual pump. This paper also presents the results of cavitation erosion tests conducted under CEA research programs. Two points are covered in the conclusion. (a) The test results show that pump noise changes with the drop in hydraulic performance characteristics, and can thus be representative of caviting conditions. (b) It should be possible to develop an acoustic method capable of discriminating between erosive and non-destructive cavitation.

9815 (CEA-CONF—6738) Recent developments and improvements in the code system for the neutronic design of fast breeder reactors at CEA. Giacometti; Estiot, J.C.; Palmiotti, G.; Grondein, C.; Le Cardinal, G.; Ravier, M. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1982. 6p. (DRNR-P—250; CONF-8209199—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750316.

From 25. NEACRP meeting; Karlsruhe, F.R. Germany (13 Aug 1982).

The new modular system has been developed using software tools ALOS, which give effectiveness and flexibility. Second step is the application of new algorithms to improve the resolution of diffusion equation. The state of art for the realisation of the new code system is briefly described.

9816 (CEA-CONF—6741) Group collapsing strategy for 3D design calculations. Cosimi, M.; Giacometti, C.; Palmiotti, G.; Salvatores, M. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1982. 13p. (DRNR-P—247; CONF-8209199—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750309.

From 25. NEACRP meeting; Karlsruhe, F.R. Germany (13 Aug 1982).

A variational principle has been applied to obtain collapsed cross-sections to be used for few group calculations of reactivity coefficients. The basic ideas have been indicated several times in the past and their appropriate use have been found very effective to reduce the computing costs of 3D design calculation of sodium void worths and control rod configuration antireactivity.

9817 (CEA-CONF—6743) Ferritic steels for French LMFBR steam generators. Aubert, M.; Mathieu, B.; Petrequin, P. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 6p. (CONF-830659—21). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750277.

From TMS/AIME topical conference on ferritic alloys for use in nuclear energy technologies; Snowbird, UT, USA (19 Jun 1983).

Portions are illegible in microfiche products.

Austenitic stainless steels have been widely used in many components of the French LMFBR. Up to now, ferritic steels have not been considered for these components, mainly due to their relatively low creep properties. Some ferritic steels are usable when the maximum temperatures in service do not exceed about 530°C. It is the case of the steam generators of the Phenix plant, where the exchange tubes of the evaporator are made of 2,25% Cr-1% Mo steel, stabilized or not by addition of niobium. These ferritic alloys have worked successfully since the first steam production in October 1973. For the SuperPhenix power plant, an "all austenitic stainless alloy" apparatus has been chosen. However, for the future, ferritic alloys offer potential for use as alternative materials in the evaporators: low alloys steels type 2,25% Cr-1% Mo (exchange tubes, tube-sheets, shells), or at higher chromium content type 9% Cr-2% Mo NbV (exchange tubes) or 12M Cr-1% Mo-V (tube-sheets). Most of these steels have already an industrial background, and are widely used in similar applications. The various potential applications of these steels are reviewed with regards to the French LMFBR steam generators, indicating that some points need an effort of clarification, for instance the properties of the heterogeneous ferritic/austenitic weldments.

9818 (CEA-CONF—6799) Multifrequency eddy current testing of helical tubes of steam generators. Pigeon, M.; David, B. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 8p. (In French). (CONF-8305152—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750264.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

In the event of a water-sodium reaction in a steam-generator of a fast breeder reactor, it is necessary to test the tubes close to the leak to evaluate the damage. In SUPERPHENIX, the tubes are about 100m long and are coiled on a dead body. This report describes the equipment and the technic to test such tubes with multifrequency eddy current technics.

9819 Lumped fission product neutron cross sections based on ENDF/B-V for fast reactor analysis. Liaw, J.R.; Henryson, H. II. (Argonne National Laboratory, Applied Physics Division, 9700 South Cass Avenue, Argonne, Illinois 60439). *Nuclear Science and Engineering;* **84**: No. 4, 324-336(Aug 1983).

The development and evaluation of a lumped fission product neutron cross-section library based on ENDF/B-V data suitable for fast reactor applications have been completed. Both one- and two-lump models have been investigated in detail. Fission product inventories at various burnup steps were calculated by the EPRI-CINDER-2 code and used as weighting functions for lumping. This paper addresses several important issues related to the lumped data including the relative merits of the two models, the dependence on burnup history, the influence of fuel composition and neutron spectrum, the impact of various data bases, the application of the lumped data, the effect of the scattering matrix, and finally the impact on the fission product reactivity worth in a fast reactor system. Although the data and results contained in this paper are specifically related to a particular mixed-oxide core design, they have general validity and application to other similar liquid-metal fast breeder reactor designs.

9820 Seismic damping factors of small bore piping as influenced by insulation and support elements. Severud, L.K.; Barta, D.A. (Westinghouse Hanford Company, Richland, WA). *American Society of Mechanical Engineers, Pressure Vessels and Piping Division, [Technical Report] PVP;* **PVP-VOL. 74**: 179-186(1983). (CONF-830607—).

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

Seismic damping tests of a prototypical Liquid Metal Fast Breeder Reactor (LMFBR) small bore piping system is described, and measured transient responses to pulse excitations are reported. The test specimen was representative of a typical LMFBR insulated small bore piping system, and it was supported from a rigid test frame by prototypic dead weight supports, mechanical snubbers, and pipe clamps. Various support configurations were tested to assess the response sensitivity to insulation and other nonlinear support characteristics. Damping factors increased significantly due to the insulation and use of mechanical snubbers. Factors much higher than the magnitudes currently allowed in design, by the USNRC Regulatory Guide 1.61, were found. This verified the design values but also pointed out the possibility of undue conservatism and costly overdesign resulting from use of the present design values.

9821 **Seventeen years of LMFBR experience: Experimental Breeder Reactor II (EBR-II).** Perry, W.H.; Lentz, G.L.; Richardson, W.J.; Wolz, G.C. (Argonne National Laboratory, Idaho Falls, ID). *Proceedings of the American Power Conference;* **44**: 801-805(May 1982). (CONF-820465—).

From 44. annual meeting of the American Power Conference; Chicago, IL, USA (26 Apr 1982).

Operating experience at EBR-II over the past 17 years has shown that a sodium-cooled pool-type reactor can be safely and efficiently operated and maintained. The reactor has performed predictably and benignly during normal operation and during both unplanned and planned plant upsets. The duplex-tube evaporators and superheaters have never experienced a sodium/water leak, and the rest of the steam-generating system has operated without incident. There has been no noticeable degradation of the heat transfer efficiency of the evaporators and superheaters, except for the one superheater replaced in 1981. There has been no need to perform any chemical cleaning of steam-system components. Operation of EBR-II has produced a wealth of information. As an irradiation facility, EBR-II has generated specific information on the behavior of oxide, carbide, and metallic fuels. As an LMFBR power plant, EBR-II has produced general information related to plant-systems and equipment design, plant safety, plant availability, and plant maintenance.

9822 **Progress in developing constitutive equations for inelastic design analysis.** Pugh, C.E. (Oak Ridge National Laboratory, Oak Ridge, TN). *American Society of Mechanical Engineers, Pressure Vessels and Piping Division, [Technical Report] PVP;* **PVP-VOL.-59**: 57-66(1982). (CONF-820601—). Contract W-7405-ENG-26.

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

A summary is given of the constitutive equations that have been developed for use in design assessments of elevated temperature components of liquid metal fast breeder reactors. The discussion addresses representations of short-term (plastic) and long-term (creep) inelastic material responses. Attention is given to improved representations of the interactions between plastic and creep deformations. Most of the discussion is in terms of constitutive equations that make use of concept of separating the total strain into elastic, plastic, and creep portions. Additionally, some discussion is given of progress being made toward establishing design equations based on unified measures of inelastic strain that do not distinguish different strain portions.

2106 Power Reactors, Auxiliary, Mobile, Package, And Transportable

9823 **(CONF-821148—4) Space reactor shielding: an assessment of the technology.** Bartine, D.E.; Engle, W.W. Jr. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 26p. NTIS, PC A03/MF A01. Order Number DE84003319.

From National Research Council symposium on advanced compact reactor systems; Washington, DC, USA (15 Nov 1982).

Space power reactor systems require shielding to protect payload and reactor shielding components, and also maintenance and operating personnel. Shield composition, size, and shape are important design considerations, since the shield can dominate the overall weight of the system. Techniques for space reactor shield design analysis and optimization and experimental test facilities are available for design verification. With these tools, a shielding technology in support of current and future space power reactor systems can be developed. Efforts in this direction should begin with a generic shielding program to provide information on materials properties and geometric effects and should be followed by project-specific shielding programs to provide design optimization and prototype shield verification.

2107 Regulation And Licensing

REFER ALSO TO CITATION(S) 9896, 10010, 10012, 10013

9824 **(NUREG—0540-Vol.5-No.10) Title list of documents made publicly available, October 1-31, 1983. Vol. 5, No. 10.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Oct 1983. 605p. NTIS, PC A99/MF A01 - GPO. Order Number DE84900651.

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This document is a monthly publication containing descriptions of information received and generated by the US NRC. This information includes (1) docketed material associated with civilian nuclear power plants and other uses of radioactive materials, and (2) nondocketed material received and generated by NRC pertinent to its role as a regulatory agency. The following indexes are included: Personal Author Index, Corporate Source Index, Report Number Index, and Cross Reference to Principal Documents Index.

9825 **(NUREG—0750-Vol.18-No.1) Nuclear Regulatory Commission issuances. Volume 18, No. 1.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Jul 1983. 163p. NTIS, PC A08/MF A01 - GPO. Order Number DE84900716.

This report includes the issuances received during July, 1983 from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM). The summaries and headnotes preceding the opinions reported herein are not to be deemed a part of those opinions or to have any independent legal significance.

9826 **(NUREG—0750-Vol.18-No.2) Nuclear Regulatory Commission issuances. Volume 18, No. 2.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Aug 1983. 149p. NTIS, PC A07/MF A01 - GPO. Order Number DE84900585.

This report includes the issuances received during August from the Commission (CLI), the Atomic Safety and Licensing Appeal Boards (ALAB), the Atomic Safety and Licensing Boards (LBP), the Administrative Law Judge (ALJ), the Directors' Decisions (DD), and the Denials of Petitions for Rulemaking (DPRM). The summaries and headnotes preceding the opinions reported are not to be deemed a part of those opinions or to have any independent legal significance.

9827 **(NUREG—0871-Vol.2-No.4) Summary information report. Volume 2.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Dec 1983. 51p. NTIS, PC A04/MF A01 - GPO. Order Number DE84900590.

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Provide summary data concerning NRC and its licensees for general use by the Chairman, other Commissioners and Commission staff offices, the Executive Director for Operations, and the Office Directors.

9828 **(NUREG—1041) Impacts of NRC programs on state and local governments.** Nussbaumer, D.A.; Lubenau, J.O. (eds.). (Nuclear Regulatory Commission, Washington, DC (USA). Office of State Programs). Dec 1983. 22p. NTIS, PC A02/MF A01 - GPO $3.25. Order Number DE84900579.

This document reports the results of an NRC staff examination of the impacts of NRC regulatory programs on State and local governments. Twenty NRC programs are identified. For each, the source of the program (e.g., statutory requirement) and NRC funding availability are described and the impacts upon State and local governments are assessed. Recommendations for NRC monitoring and assessing impacts and for enhancing NRC staff awareness of the impacts are offered.

2108 Economics

9829 ORIGEN2: A versatile computer code for calculating the nuclide compositions and characteristics of nuclear materials. Croff, A.G. (Oak Ridge National Laboratory, Chemical Technology Division, P.O. Box X, Oak Ridge, Tennessee 37830). *Nuclear Technology;* **62**: No. 3, 335-352(Sep 1983).

ORIGEN2 is a versatile point-depletion and radioactive-decay computer code for use in simulating nuclear fuel cycles and calculating the nuclide compositions and characteristics of materials contained therein. It represents a revision and update of the original ORIGEN computer code, which was developed at the Oak Ridge National Laboratory (ORNL) and distributed worldwide beginning in the early 1970s. Included in ORIGEN2 are provisions for incorporating data generated by more sophisticated reactor physics codes, a free-format input, and a highly flexible and controllable output; with these features, ORIGEN2 has the capability for simulating a wide variety of fuel cycle flow sheets. The decay, cross-section, fission product yield, and photon emission data bases employed by ORIGEN2 have been extensively updated, and the list of reactors that can be simulated includes pressurized water reactors, boiling water reactors, liquid-metal fast breeder reactors, and Canada deuterium uranium reactors. A number of verification activities have been undertaken, including comparison of ORIGEN2 decay heat results with both calculated and experimental values, and comparison of predicted spent fuel compositions with measured values. The agreement between ORIGEN2 and the comparison bases is generally very good.

2109 Process Heat Reactors

9830 (PNL-tr—435) Thermal-power nuclear reactor. Chaix, J.E.; Fajeau, M.; Borgne, E.L.; Zerouki, A. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. Translation of French patent application No. 75-12210. 17p. NTIS, PC A02/MF A01. Order Number DE84001197.

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The invention described a thermal-power nuclear reactor which satisfies the safety criteria required for urban heating. The reactors controlled by the use of a liquid absorbent. This reactor comprises, in the interior of a vessel, first a core cooled by a primary fluid circulating in the vessel by natural convection, for which purpose the fuel assemblies are, for example, assemblies of the plate type, and second a heat exchanger, for example of the immersion-tube type, through which a secondary fluid flows. The objective of the invention is a nuclear reactor which has the advantage of exhibiting both reliable and simple operation for a low investment cost.

22 NUCLEAR REACTOR TECHNOLOGY

2201 Theory And Calculation

REFER ALSO TO CITATION(S) 9775, 9779

9831 (CEA-CONF—6740) Heating measurements in a heterogeneous core configuration. Calamand, D. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1982. 6p. (DRNR-P—248; CONF-8209199—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750314.

From 25. NEACRP meeting; Karlsruhe, F.R. Germany (13 Aug 1982).

The present paper gives an outline of the performed experiments, some preliminary indications of the calculational method used and a first comparison with raw experimental data.

9832 (Juel-Conf—17, pp 17-29) Creation of energy through nuclear fission. Barnert, H.; Wolters, J. Jan 1983. (In German). Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

In Benefits and risks of nuclear energy.

In addition to the process of nuclear fission and that of the breeder reactor, the most important types of power reactors are explained principly by the DWR, the SWR, the HTR and the SBR. The connection between efficiency and waste heat is discussed, and examples for the utilisation of waste heat are given.

9833 (KFKI—1983-37) Studies to the stochastic theory of the coupled reactor kinetic-thermohydraulic systems Pt. 1. Space dependent model with one variable. Mesko, L.; Kozma, R.; Katona, T. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Apr 1983. 14p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704569.

The problems for establishing a theoretical noise model based on Markovian description has been investigated. The reactor system is characterized by a single variable. The spatial correlation function and the power spectral density function in wave number space are also included in the treatment.

2202 Components And Accessories

REFER ALSO TO CITATION(S) 9917, 9918, 9919, 10210, 10439

9834 (CEA-CONF—6782) Influence of geometrical imperfections on the buckling loads and vibrations of fluid structure systems. Combescure, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 30p. (CONF-830582—5). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750325.

From Structural dynamics meeting; Ispra, Italy (16 May 1983).

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The buckling of shells subjected to seismic type of loads is not very well known. To study this type of phenomenon, theoretical and experimental investigations on structures consisting of two shells separed by a thin fluid layer , and submitted to a seismic type of load have been performed. The objectives of these investigations are the following: study coupling between buckling modes vibrations modes and buckling, and the effects of this coupling on the level of pressure; study of the appearance on such structures of dynamic instabilities processes; qualification of computer codes of the CEASEMT system; and, qualification or criticism of the methodology used in the design based on a "static equivalent" idea.

9835 (CEA-CONF—6801) Device for direct digitized radiology of small objects. Thomas, G.; Favier, C.; Brebant, C.; Mogavero, R. (CEA Centre d'Etudes Nucleaires de Grenoble, 38 (France); CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Jun 1983. 5p. (In French). (CONF-8305152—6). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750280.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

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A radiological device has been developed to obtain direct digitized views with a large integration time. A micro computer system with programs specially developed for the automatic materials defects evaluation is used. Some results concerning the weldings of electro-nuclear fuel pins are presented here.

9836 (DOE/ET/34209—32) Flow-induced vibration for light water reactors. Program final report. Corr, J.E. (General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.). Mar 1983. Contract AC02-77ET34209. 302p. (GEAP—22274). NTIS, PC A14/MF A01. Order Number DE84004623.

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The Flow-Induced Vibrations for Light Water Reactors Program was a five-year effort to develop basic knowledge and understanding needed to improve the flow-induced vibration design of light water reactors. Major tasks included analytical and test investigations of the flow-induced vibration of cylinders in isolation and arrays in smooth and turbulent single-vibration testing of reactor components including reactor inlet plenum components, jet pumps,

low-pressure coolant injection coupling, and fuel rods. Cases of self-excited limit cycle response were encountered which required design modifications. The fuel rod tests were made in axially flowing water and steam/water mixtures under adiabatic and boiling conditions.

9837 (NUREG/CP—0045-Vol.2, pp 679-692) **Experimental study on the vibrational characteristics of piping snubbers.** Kobatake, K.; Ooka, Y.; Suzuki, M.; Katsuki, T.; Hashimoto, T. (Kawaski Heavy Industries, Ltd., Tokyo, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Oil snubbers have been widely used for the anti-earthquake suports of piping systems in nuclear power plants. Several types of mechanical snubbers are now being considered. Vibration tests were performed on three models to obtain their fundamental characteristics by using a shaking table. From tests on a pendulum structure model, a piping model, and a vessel model, the equivalent stiffness and fundamental characteristics are estimated, and useful suggestions for applications are made.

9838 (NUREG/CR—3391-Vol.1) **LWR pressure vessel surveillance dosimetry improvement program. Quarterly progress report, January 1983-March 1983. Volume 1.** Lippincott, E.P.; McElroy, W.N. (Hanford Engineering Development Lab., Richland, WA (USA)). Nov 1983. Contract AC06-77RL01030. 87p. (HEDL-TME—83-21). NTIS, PC A05/MF A01 - GPO $4.50. Order Number DE84004657.

The Light Water Reactor Pressure Vessel Surveillance Dosimetry Improvement Program (LWR-PV-SDIP) has been established by NRC to improve, test, verify, and standardize the physics-dosimetry-metallurgy, damage correlation, and the associated reactor analysis methods, procedures and data used to predict the integrated effect of neutron exposure to LWR pressure vessels and their support structures. A vigorous research effort attacking the same measurement and analysis problems exists worldwide, and strong cooperative links between the US NRC-supported activities at HEDL, ORNL, NBS, and MEA-ENSA and those supported by CEN/SCK (Mol, Belgium), EPRI (Palo Alto, USA), KFA (Juelich, Germany), and several UK laboratories have been extended to a number of other countries and laboratories. These cooperative links are strengthened by the active membership of the scientific staff from many participating countries and laboratories in the ASTM E10 Committee on Nuclear Technology and Applications. Several subcommittees of ASTM E10 are responsible for the preparation of LWR surveillance standards.

9839 (PNL-SA—11636) **Acoustic emission monitoring of ZB-1 intermediate scale vessel test.** Hutton, P.H.; Kurtz, R.J.; Pappas, R.A. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 17p. (CONF-8310224—1). NTIS, PC A02/MF A01. Order Number DE84004849.

From MPA seminar on safety of light water reactor pressure vessels; Stuttgart, F.R. Germany (13 Oct 1983).

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Primary results derived to date from the 70°C portion of the testing include: (1) demonstration of the ability of AE to signal an impending failure condition, (2) AE from fatigue crack growth can be consistently detected using sensing methods directly applicable to reactor monitoring, (3) special features of the AE data such as signal amplitude produced by crack growth and the location of the AE data relative to the load cycle are becoming evident, (4) the reliability of AE in detecting cracks during inservice hydrostatic testing is being defined, (5) use of AE data to estimate flaw severity appears to be feasible, and (6) the pattern recognition method for identifying AE signals from crack growth must be improved but evidence indicates that it can be made to perform acceptably.

9840 (SV-FUD—1-14) **Program for parameter studies of steam generators.** Mathisen, R.P. (Statens Vattenfallsverk, Vaellingby (Sweden)). Nov 1982. 29p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704602.

R2-GEN is a computer code for stationary thermal parameter studies of steam generators. The geometry and data are valid for Ringhals-2 generators. Subroutines and relevant calculations are included. The program is based on a heterogeneous flow model and some applications on tubes with varying contamination are presented.

9841 **An analysis of dynamic crack propagation and arrest in a nuclear pressure vessel under thermal shock conditions.** Jung, J.; Kanninen, M.F. (Sandia National Laboratories, Albuquerque, NM 87185). *Journal of Pressure Vessel Technology;* **105**: No. 2, 111-116(May 1983).

The inner wall of a nuclear pressure vessel can become embrittled during service due to irradiation effects. As a result, a small flaw could become critical during the thermal shock that would accompany a loss-of-coolant-accident. To assess the consequences of this possibility, elastodynamic computations were performed on the subsequent rapid unstable crack run-arrest events. One difficulty is the lack of reliable dynamic fracture toughness data as a function of crack speed and temperature. However, using plausible estimates, computational results were obtained for comparison with conventional quasi-static analyses. These indicate that the neglect of the dynamic effects is mildly anticonservative for this application.

2203 Fuel Elements

9842 (CEA-CONF—6673) **Operation of a neutron radiography facility using nitrocellulose films as solid track detectors.** Barbalat, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 5p. (In French). (CONF-8305152—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750270.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

A scanning neutron radiography unit has been installed at the Saclay Research Centre. This fully automated facility uses nitrocellulose film and makes it possible to examine with a narrow neutron beam several irradiated fuel rods up to 4m long, arranged upright side by side, within a few hours. The results achieved with this method are superior to those achieved with the classical indirect method.

9843 (CEA-CONF—6733) **Temperature field downstream of an heated bundle mock-up results for different power distribution.** Girard, J.P.; Buravand, Y. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Oct 1982. 21p. (DRNR-P—254; CONF-821068—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750310.

From 10. liquid metal boiling working group meeting; Karlsruhe, F.R. Germany (27 Oct 1982).

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The aim of these peculiar experiments performed on the ML4 loop in ISPRA is to evaluate the characteristics of the temperature field over a length of 20 to 30 dias downstream of a rod bundle for different temperatures profiles at the bundle outlet. The final purpose of this work will be to establish either directly or through models whether it is possible or not to detect subassembly failures using suitable of the subassembly outlet temperature signal. 15 hours of digital and analog recording were taped for five different power distributions in the bundle. The total power dissipation remained constant during the whole run. Two flow rates and seven axial location were investigated. It is shown that the different temperature profiles produce slight differences in the variance and skewness of the temperature signal measured along the axis of the pipe over 20 dias.

9844 (CEA-CONF—6763) **Application of X ray microanalysis and gamma spectrometry to the study of the behaviour of gaseous and volatile fission products in transient conditions.** Trotabas, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 23p. (In French). (CONF-8306147—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750288.

From Seminar on nuclear fuels; Moscow, USSR (20 Jun 1983).

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The behaviour of fuel element during power variations is studied to evidence pellet-clad interactions. Power variations were tested on 30 fuel rods with a specific burnup over 40000MWd/tsub(u). Some pencils did not burst during the test and it was possible to measure gas fractions and to study threshold temperature for Xe and Cs production. The temperature of Xe and Cs emission is lowered of about 200°C when the specific burnup increase from 20000 to 40000 MWd/tsub(u).

9845 **(CONF-8310235—1) Fracture behavior of high-burnup spent-fuel cladding.** Chung, H.M.; Yaggee, F.L.; Kassner, T.F. (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE84003650.

From IAEA specialists' meeting on pellet-cladding interaction in water reactor fuel; Seattle, WA, USA (3 Oct 1983).

PCI-like, brittle-type failures, characterized by pseudocleavage-plus-fluting features in the fracture surface, branching cracks, and small diametral strain, were observed to occur at 292 to 325°C in some batches of spent power-reactor fuel-cladding tubes under internal gas-pressurization and expanding-mandrel loading conditions in which the tests were not influenced by fission product simulants. Fractographic characteristics per se do not provide evidence for a PCI failure mechanism but should be deemed only as cooroborative in nature. Evaluation of TEM thin-foil specimens, obtained from regions adjacent to the brittle-type fracture sites, characteristically revealed extensive amounts of Zr_3O precipitates and a lack of slip dislocations. The precipitation of the Zr_3O phase appears to be enhanced by a high density of irradiation-induced defects. The brittle-type failure produced in the spent-fuel cladding tubes appears to be associated with segregation of oxygen to dislocation substructures and irradiation-induced defects, which leads to the formation of an ordered zirconium-oxygen phase of Zr_3O, an immobilization of dislocations, and minimal plastic deformation in the cladding material.

9846 **(IAEA-TECDOC—286) Utilization of particle fuels in different reactor concepts. Survey of world experience.** (International Atomic Energy Agency, Vienna (Austria)). Apr 1983. 55p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704572.

To date, particle fuel is only used in high temperature reactors (HTR). In this reactor type the particles exist of oxide fuel with a diameter of about 0.5 mm and are surrounded by various coatings in order to safely enclose fission products and decrease the radioactive release into the primary circuit. However, it is felt that fuel based upon spherical particles could have some advantages compared with pellets both on fabrication and in-core behaviour in several reactor concepts. This fuel is now of general interest and there is a high level of research and development activity in some countries. In order to collect, organize additional information and summarize experience on utilization of particle fuels in different reactor concepts, a questionnaire was prepared by IAEA in 1980 and sent to Member States, which might be involved in relevant developments. This survey has been prepared by a group of consultants and is mainly based on the responses to the IAEA questionnaire.

9847 **(IFE/KR/E—11V) Methods of RECORD, an LWR fuel assembly burnup code.** Skardhamar, T.; Naess, H.K. (Institute for Energy Technology, Kjeller (Norway)). Jun 1982. 163p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704600.

The RECORD computer code is a detailed reactor physics code for performing efficient LWR fuel assembly calculations, taking into account most of the features found in BWR and PWR fuel designs. The code calculates neutron spectrum, reaction rates and reactivity as a function of fuel burnup, and it generates the few-group data required for use in full scale core simulation and fuel management calculations. The report describes the methods of the RECORD computer code and the basis for fundamental models selected, and gives a review of code qualifications against measured data.

9848 **(NUREG/CP—0045-Vol.2, pp 527-541) HTGR fuel performance basis.** Shamasundar, B.I.; Stansfield, O.M.; Jensen, D.D. (General Atomic Co., San Diego, CA). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2). Contract AT03-76ET35300.

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The safety characteristics of the high-temperature gas-cooled reactor (HTGR) during normal and accident conditions are determined in part by HTGR fuel performance. During normal operation, less than 0.1% fuel failure occurs, primarily from defective particles. This low fuel failure fraction limits circulating activity to acceptable levels. During severe accidents, the radiological consequence is influenced by high-temperature fuel particle behavior. An empirical fuel failure model, supported by recent experimental data, is presented. The onset of significant fuel particle failure occurs at temperatures in excess of 1600°C, and complete fuel failure occurs at 2660°C. This indicates that the fuel is more retentive at higher temperatures than previously assumed. The more retentive nature of the fuel coupled with the high thermal capacitance of the core results in slow release of fission products from the core during severe accidents. The slow release of fission products over hundreds of hours allows for decay of short-lived isotopes. The slow and limited release of fission products under HTGR accident conditions results in very low off-site doses. The slow nature of the accident provides more time for operator action to mitigate the accident and for local and state authorities to respond. These features can be used to take advantage of close-in siting for process applications, flexibility in site selection, and emergency planning.

9849 **(NUREG/CP—0045-Vol.2, pp 574-586) Fission product retention in HTGR fuels.** Homan, F.J.; Kania, M.J.; Teigs, T.N. (Oak Ridge National Lab., TN). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Retention data for gaseous and metallic fission products are presented for both Triso-coated and Biso-coated HTGR fuel particles. Performance trends are established that relate fission product retention to operating parameters, such as temperature, burnup, and neutron exposure. It is concluded that Biso-coated particles are not adequately retentive of fission gas or metallic cesium, and Triso-coated particles which retain cesium still lose silver. Design implications related to these performance trends are identified and discussed.

9850 **(PNL-SA—11681) Model for the iodine-induced strain rate sensitivity of Zircaloy fuel rod cladding.** Williford, R.E. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 36p. (CONF-8310235—2). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84003355.

From IAEA specialists' meeting on pellet-cladding interaction in water reactor fuel; Seattle, WA, USA (3 Oct 1983).

A model has been developed to describe the strain rate sensitivities and failure times characteristic of iodine-induced failures for Zircaloy fuel rod cladding. The foundation of the model is a creep cracking formulation that predicts crack initiation times and growth rates as functions of the material creep and fracture related parameters. Other elements of the model include: iodine depletion by chemical reaction with Zircaloy to form ZrI_4, diffusion of the ZrI_4 down the crack, chemisorption of ZrI_4 at the crack tip, and subsequent embrittlement of the Zircaloy. In essence, the model (CCSCC) describes the transition from the slower creep cracking (CC) regime to the faster (more observable) stress corrosion cracking (SCC) regime. Benchmarking of the CCSCC model to laboratory SCC burst test data indicates that the Zircaloy-iodine SCC process is dominated by chemical reaction and material creep rate phenomena, rather than by stress thresholds or by the requirement that a complete monolayer of corrosive agent form on the fresh Zircaloy at the crack tip. Failure times are dominated by the time required to initiate active crack growth, which is best determined by nonlinear damage models. There was no evidence that the SCC fracture process may be limited by diffusion kinetics on the time scale of laboratory experiments. Results indicate that the CCSCC

model may be improved by accounting for the reduction in ZrI_4 production caused by the formation of solid ZrI/sub x/ condensates at high initial iodine concentrations.

9851 **Aqueous corrosion of uranium aluminide fuel.** Vinjamuri, K.; Hobbins, R.R. (EG & G Idaho, Inc., P.O. Box 1625, Idaho Falls, Idaho 83415). *Nuclear Technology;* 62: No. 2, 145-150(Aug 1983). Contract AC07-76ID01570.

A postirradiation examination of two uranium aluminide (UAl /SUB x/) fuel plates from the Advanced Test Reactor (ATR) was conducted. The two fuel plates failed due to pinhole corrosion during irradiation to about 76% of the maximum burnup limit of 2.3 X 10^{21} fission/cm^3. It is believed that the aluminum cladding failed due to pit corrosion initiated at an existing pit about 0.0076 to 0.0102 cm (3 to 4 mil) deep at a hot spot. About 0.2 and 0.8 g of UAl /SUB x/ fuel was washed out of these plates through the pinholes due to aqueous corrosion and erosion of the UAl / SUB x/ under ATR primary coolant conditions. Aluminum cladding pit corrosion depth and UAl /SUB x/ fuel corrosion-erosion mass rates under the ATR primary coolant conditions were calculated to be 0.23 cm/yr and 14 g/yr, respectively.

9852 **Global optimality analysis of nuclear reactor assemblies with multi-component controllers.** Alldemir, T. (Univ. of Illinois, Urbana); Axford, R.A. pp 623-624 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

2204 Control Systems

9853 **(CEA-CONF—6739) Control absorber rod in Phenix. Comparison of calculated and measured worths.** Humbert, G.; Petiot, R.; Coulon, P. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1982. 11p. (DRNR-P—249; CONF-8209199—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750315.

From 25. NEACRP meeting; Karlsruhe, F.R. Germany (13 Aug 1982).

For SPX1 design purposes, a so called "SAC" (complementary shut down system) rod has been set up at the center of the Phenix core. This gave the opportunity of making a design rod worth calculation check on this simple configuration. Calculations methods are shortly described and an experiment to calculation comparison is made. The type of agreement obtained is coherent with the uncertainty now applied to design rod worth calculation.

9854 **(JINR-R—3-82-770) Measurement of differential cross sections of neutron scattering with nuclei on the IBR-30 reactor.** Vagov, V.A.; Ermakov, V.A.; Zimin, G.N.; Zo In Ok; Nikolaenko, V.G.; Popov, A.B.; Samosvat, G.S. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). 1982. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704601.

On-line control system for measurements on the IBR-30 pulsed reactor of angular distributions of scattered neutrons is described. The system is based on the MERA-60-30 microcomputer. The methods of data collection and determination of energy scale and scattering cross section are given. The way of data processing with the PDP-11/70 computer in order to obtain averaged scattering differential cross section parameters is described. As an example, the results for Rh, Ag, Ta and Re nuclei are given. These are found with approximately 25 ns/m resolution in the 3-200 keV energy range. The unit for physical facility control is described in supplement.

9855 **(KFKI—1983-08) DUAL-PROCESS, a highly reliable process control system.** Buerger, L.; Gossanyi, A.; Parkanyi, T.; Szabo, G.; Vegh, E. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Feb 1983. 34p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704573.

A multiprocessor process control system is described. During its development the reliability was the most important aspect because it is used in the computerized control of a 5 MW research reactor. DUAL-PROCESS is fully compatible with the earlier single processor control system PROCESS-24K. The paper deals in detail with the communication, synchronization, error detection and error recovery problems of the operating system.

9856 **(KFKI—1983-41) Stochastic aspects of two-dimensional vibration diagnostics.** Pazsit, I.; Gloeckler, O.; Antonopoulos-Domis, M. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Apr 1983. 37p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704574.

Two-dimensional stochastic vibrations of a particle, representing lateral damped forced oscillations of a reactor control rod are simulated by generating random force components and integrating the equations of motion. It was investigated how various statistical descriptors of the motion such as trajectory pattern, displacement components spectra and APD functions depend on the characteristics of the driving force for both stationary and non-stationary cases. It was found that the APD functions of the dis-placement components, or that of the neutron noise induced by the vibrating component can be a good indicator of whether a particular peak in the corresponding power spectra belongs to a resonance in system transfer or rather to a resonance in the external driving force.

9857 (NUREG/CP—0045-Vol.2, pp 669-678) **Thermal and stress analysis of control rod.** Miyamoto, Y. (Japan Atomic Energy Research Inst., Ibaraki-ken); Omori, J.; Araki, T.; Shibui, M.; Nishizawa, H. 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

In order to survey the mechanical integrity of a control rod in the high temperature core of the VHTR, thermal analysis and thermal stress analysis were carried out by means of calculus of finite differentials and finite element methods for the plant under the normal operating condition as well as under several abnormal conditions. The results of the analyses have been applied to refine the mechanical design of the control rod.

2205 Environmental Aspects

REFER ALSO TO CITATION(S) 9938, 10679, 10755

9858 **(NUREG/CR—3165) Physical tests on solidified decontamination wastes from Dresden Unit 1.** Barletta, R.E.; Adams, J.W.; Davis, R.E. (Brookhaven National Lab., Upton, NY (USA)). Dec 1983. Contract AC02-76CH00016. 109p. (BNL-NUREG—51648). NTIS, PC A06/MF A01 - GPO $5.00. Order Number DE84005092.

Immersion and leach tests of NS-1 concentrate solidified in a vinyl ester-styrene binder in a solidification demonstration at Dresden Nuclear Power Station were conducted. These forms were immersed in toluene, xylene, and water saturated with toluene and xylene. Total weight changes as a result of immersion of 9.6 +- 0.3% and 21.6 +- 0.7% were observed after 839 hours of immersion in xylene and toluene respectively. Air drying of the samples led to an overall weight loss of 23.5 +- 0.7% for xylene and 35.6 +- 0.6% for toluene. Qualitatively, similar changes were observed for immersion tests using organic saturated water. Severe sample deterioration was observed in this case, however. The behavior of cut and uncut samples from leach tests subjected to immersion in either organic saturated water or toluene was qualitatively the same as for the sectioned sample. Severe sample deterioration was noted in both cut and uncut forms immersed in organic saturated water. Leach tests were carried out to measure the iron and nickel and cobalt release from these waste forms in deionized water, groundwater, and seawater. After 64 days, the mean fraction released normalized by V/S for iron was 5.1 +- 1.9 x 10^{-3} cm in deionized water, 7.1 +- 1.1 x 10^{-3} cm in groundwater, and 1.0 +- 3.2 x 10^{-3} in seawater. For nickel, 64 day release rates observed were 4.6 +- 1.6 x 10^{-3} cm, 4.6 +- 1.0 x 10^{-3} cm, and 5.9 +- 0.6 x 10^{-3} cm in

deionized water, groundwater, and seawater, respectively. After 50 days, the ^{59}Fe release rates are 5.9 +- 0.7 x 10^{-3}, 4.8 +- 2.4 x 10^{-3}, and 2.8 +- 1.0 x 10^{-3} cm in deionized water, groundwater, and seawater, respectively. For ^{60}Co, the 50 day releases in the three respective leaching media are 6.0 +- 1.7 x 10^{-3} cm, 6.8 +- 1.0 x 10^{-3} cm, and 2.3 +- 0.2 x 10^{-3} cm.

9859 (NUREG/CR—3542) Modeling mesoscale diffusion and transport processes for releases within coastal zones during land/sea breezes. Lyons, W.A.; Keen, C.S.; Schuh, J.A. (Minnesota Univ., Minneapolis (USA). Dept. of Mechanical Engineering). Dec 1983. 202p. NTIS, PC A10/MF A01 - GPO $6.00. Order Number DE84900627.

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This document discusses the impacts of coastal mesoscale regimes (CMRs) upon the transport and diffusion of potential accidental radionuclide releases from a shoreline nuclear power plant. CMRs exhibit significant spatial (horizontal and vertical) and temporal variability. Case studies illustrate land breezes, sea/lake breeze inflows and return flows, thermal internal boundary layers, fumigation, plume trapping, coastal convergence zones, thunderstorms and snow squalls. The direct application of a conventional Gaussian straight-line dose assessment model, initialized only by onsite tower data, can potentially produce highly misleading guidance as to plume impact locations. Since much is known concerning CMRs, there are many potential improvements to modularized dose assessment codes, such as by proper parameterization of TIBLs, forecasting the inland penetration of convergence zones, etc. A three-dimensional primitive equation prognostic model showed excellent agreement with detailed lake breeze field measurements, giving indications that such codes can be used in both diagnostic and prognostic studies. The use of relatively inexpensive supplemental meteorological data especially from remote sensing systems (Doppler sodar, radar, lightning strike tracking) and computerized data bases should save significantly on software development costs. Better quality assurance of emergency response codes could include systems of flags providing personnel with confidence levels as to the applicability of a code being used during any given CMR.

9860 (SSI-A—83-04) Radiation doses from the release into the water of the Barsebaeck power plant. Boge, R.; Nordlinder, S. (Statens Straalskyddsinstitut, Stockholm (Sweden)). 24 Feb 1983. 22p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704552.

The experience of radiation protection viewpoints from control investigations round the Barsebaeck plant is reviewed. The release has been far below the limits stated by the water rights court. The calculated individual and collective doses are low and the effect of the activity release on the recipient has been negligible as regards damage to human beings and to ecology.

9861 (SSI-K—82-06) Release of activity and ocupational exposures of the nuclear power industry. Third quarter 1982. (Statens Straalskyddsinstitut, Stockholm (Sweden)). 1982. 15p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704557.

The report gives a compilation of the release of radioactivity from nuclear power stations during July-September 1982 presented as standardized release and as an index of collective dose equivalent. Radiation doses to the personnel are also reported.

2206 Research, Test, And Experimental Reactors

REFER ALSO TO CITATION(S) 9444, 9855, 9886, 10434, 10638

9862 (AD-A—132024/1) Results of integral experiments on VERA assemblies. Paterson, W.J.; McCormick, W.B.; McTaggart, M.H. (UKAEA Weapons Group, Aldermaston. Atomic Weapons Research Establishment). Jun 1983. 23p. (AWRE-O—9/83). NTIS, PC A02/MF A01.

The VERA reactor at AWRE has been used to study problems in the UK fast power reactor programme and in research reactor design. However, its main function has been to provide experimental results for small fast assemblies against which calculations can be compared to improve the nuclear cross-sections used. This report outlines the experimental methods used in the VERA work and gives the results.

9863 (AEEW-R—1446) Oscillator measurements of the reactivity changes resulting from the irradiation of low enrichment particulate fuel in the Dragon reactor. Burbidge, B.L.H.; Franklin, B.M.; Small, V.G. (UKAEA Atomic Energy Establishment, Winfrith). Jan 1983. 138p. (DP-R—985). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704578.

This Report describes a series of experiments carried out as a joint UKAEA/CEA/DRAGON project to determine the reactivity changes of low-enrichment particulate fuel samples following their irradiation in the DRAGON reactor to various levels up to approximately 60,000 MWD/Te. The samples are described, together with the method of measurement of reactivity in the Winfrith reactor HECTOR, which was an extension of the well-known Oscillator Technique to yield simultaneously overall reactivity changes and changes in macroscopic absorption cross-sections. Measurements were carried out at room temperature in two reactor spectra; a thermal spectrum and one typical of an HTR type reactor. The resultant reactivity changes are presented together with the relevant sample burn-ups as determined by γ-scanning methods and, in some cases, by rigorous chemical analysis. The results of supporting measurements are also reported, carried out to characterise the neutron spectra in which the oscillator measurements were made and to determine the neutron flux distributions in the HECTOR reactor.

9864 (DP-MS—83-80) Study of the U_3O_8-Al thermite reaction and strength of reactor fuel tubes. Peacock, H.B. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1983. Contract AC09-76SR00001. 9p. (CONF-8310176—8). NTIS, PC A02/MF A01. Order Number DE84000959.

From International meeting on reduced enrichment for research and test reactors; Tokai, Japan (24 Oct 1983).

Research and test reactors are presently operated with aluminum-clad fuel elements containing highly enriched uranium-aluminum alloy cores. To lower the enrichment and still maintain reactivity, the uranium content of the fuel element will need to be higher than currently achievable with alloy fuels. This will necessitate conversion to other forms such as U_3O_8-aluminum cermets. Above the aluminum melting point, U_3O_8 and aluminum undergo an exothermic thermite reaction and cermet fuel cores tend to keep their original shape. Both factors could affect the course and consequences of a reactor accident, and prompted an investigation of the behavior of cermet fuels at elevated temperatures. Tests were carried out using pellets and extruded tube-sections with 53 wt % U_3O_8 in aluminum. This content corresponds to a theoretical uranium density of 1.9 g/cc. Results indicate that the thermite reaction occurs at about 900°C in air without a violent effect. The heat of reaction was approximately 123 cal/g of U_3O_8-aluminum fuel. Tensile and compressive strength of the fuel tube section is low above 660°C. In tension, sections failed at about the aluminum melting point. In compression with 2-psi average axial stress, failure occurred at 917°C, while 7 psi average axial stress produced failure at 669°C.

9865 (FEI—1271) Methods of materials mechanical tests in nuclear BR-10 reactor. 4. Devices with torgue load transmission. Bul'kanov, M.G.; Kruglov, A.S.; Moseev, V.I. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij). 1982. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704114.

In-pile test devices are considered intended to study specimens creep and long-term strength under neutron flux in BR-10 fast reactor core. An electric-mechanical drive is used as a basic exiter for torque loading of force transmission elements of the test device. Test complex, developed on the base of one power supply mechanism, permits to obtain torsion and bending stress-strain states on specimens of various configuration. The device is described where several tubular specimens can be torsion tested in succession.

9866 (JINR—13-82-701) System for monitoring the IBR-2 pulsed reactor power for the experiments during the reactor operating start-up. Bogdzel', A.A.; Pepelyshev, Yu.N.; Solo'ev, B.N.; Tishin, V.G.; Shabalin, E.P. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). 1982. 7p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704163.

The system for monitoring the IBR-2 pulsed reactor power during the reactor operating start-up is described. The system consists of three independent functional blocks for measuring values proportional to the average number of neutrons detected during a known period of time. The measured values, in particular, are: the number of pulses from the ionization chamber or the charge stored in a detector per a known number of power pulses (in the pulsed mode of operation) or during a known time interval (in the stationary mode). The power monitoring range is 1 W-4 MW with relative error of about 1% both in the pulsed and stationary regimes. An auxiliary current monitor of running power value is used only in the stationary mode for the power range from 0.01 W up to 100 kW.

9867 (NFL—36) Progress report 1982. (Studsvik Science Research Lab., Nykoeping (Sweden)). 1983. 109p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704453.

The channels around the Studsvik R2-reactor are equipped with spectrometers and diffractometers for experiments using neutron scattering as a tool. The programme comprises the study of molecular motion in liquid metals and salts, the determination of static and dynamic scattering factors, and the diffusion of hydrogen in alloys. Elementary excitations in liquid ^{3}He and the nuclear spin ordering in solid ^{3}He are studied. The study of crystal structures has continued both with single crystals and powders. The number flux of the Studsvik R2-0 reactor which is up to 4 x 10^{11} thermal n/cm^3/s is used in the isotope-separator-on-line experiment OSIRIS. The decay properties, including the emission of delayed neutrons of short-lived fission products and thermal neutron induced fission of ^{235}U have been studied. The Van de Graaff accelerator is used for various experiments in neutron physics including elastic scattering from Pb and ^{209}Bi, inelastic scattering from ^{141}Pr and other precision measurements. The laboratory has participated in international intercomparison work. The accelerator is also used for integral determination of the decay heat in nuclear fuel, for neutron diagnostical methods and for analytical determination using the PIXE technique. The radiation chemistry group has studied primary reactors in crystalline organic materials using pulse radiolysis and ESR spectroscopy techniques. Recently, cationic species of hydrocarbons have been studied.

9868 (SAND—83-1973C) Sandia Pulse Reactor-IV Project. Reuscher, J.A. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 7p. (CONF-8309181—2). NTIS, PC A02/MF A01. Order Number DE84000450.

From SUBWOG-6N meeting; London, UK (14 Sep 1983).
Portions are illegible in microfiche products.

Sandia National Laboratories has developed, designed and operated fast burst reactors for over 20 years. These reactors have been used for a variety of radiation effects programs. During this period, programs have required larger irradiation volumes primarily to expose complex electronic systems to postulated threat environments. As experiment volumes increased, a new reactor was built so that these components could be tested. The Sandia Pulse Reactor-IV is a logical evolution of the two decades of fast burst reactor development at Sandia.

9869 Effects of fuel rod length on in-core relocation of liquefied material. Haggag, F.M.; Siefken, L.J. (EG and G Idaho Inc.). *AIChE (American Institute of Chemical Engineers) Symposium Series;* 79: No. 225, 303-309(1983). Contract AC07-81ID12317.

Severe fuel damage experiments are being conducted in the Power Burst Facility (PBF) at the Idaho National Engineering Laboratory. Since the fuel rods used in PBF experiments are short (0.9144 m) compared to those used in commercial reactors (3.658 m), the influence of fuel rod length on the relocation of liquefied fuel rod material during a severe reactor accident was studied. The LIQSOL model of the Severe Core Damage Analysis Packed (SCDAP) code was used to calculate the motion of molten material, the rate of solidification, the crust axial profile, and the coolant flow channel blockage. These calculations were performed for two hypothetical accidents; one in a core having short test fuel rods and the other in a core with commercial-size fuel rods. The results, presented in this paper, indicate the severe fuel damage experiments, using short test fuel rods, can be used to understand the relocation of liquefied fuel rod material in commercial reactors.

2207 Plutonium And Isotope Production Reactors

9870 (DPST—79-509) Energy recovery with hydraulic turbines. Jarriel, J.L.; Price, J.B. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 24 Sep 1979. Contract AC09-76SR00001. 27p. NTIS, PC AA03. Order Number DE84003720.

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The feasibility of using the reactor cooling water to drive conventional hydraulic turbine-generator systems has been studied and two different concepts have been evaluated. The first involved recovery of the hydraulic head of the cooling water effluent in (P,K,C) areas with hydraulic turbines. The second involves use of these turbines to replace the current function of the cooling water throttle valves at the 186 basin inlet in C and K areas. The costs and benefits associated with each of these concepts are presented in this report.

2208 Propulsion Reactors

9871 Performance demonstration of a high-power space reactor heat pipe design. Merrigan, M.A.; Keddy, E.S.; Kemme, J.E.; Martinez, E.H.; Runyan, J.E. (Los Alamos National Laboratory, Los Alamos, New Mexico). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1874-1879(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Performance of a 15.9-mm diam, 2-m long, artery heat pipe has been demonstrated at power levels to 22.6 kW and temperatures to 1500 K. The heat pipe employed lithium as a working fluid with distribution wicks and arteries fabricated from 400 mesh Mo-41 wt% Re screen. Molybdenum alloy (TZM) was used for the container. Peak axial power density attained in the testing was 19 kW/cm^2 at 1465 K. The corresponding radial flux density in the evaporator region of the heat pipe was 150 W/cm^2. The extrapolated limit for the heat pipe at its 1500 K design point is 30 kW, corresponding to an axial flux density of 25 kW/cm^2. Sonic and capillary limits for the design were investigated in the 1100 to 1500 K temperature range. Excellent agreement of measured and predicted temperature and power levels was observed.

2209 Reactor Safety

REFER ALSO TO CITATION(S) 10472, 10680

9872 (AEEW-M—1911) TRACMAB. A computer code to form part of the link between the codes TRAC and MABEL. Newbon, S. (UKAEA Atomic Energy Establishment, Winfrith). May 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704576.

This report describes the function of the link program TRACMAB and provides a guide for users. The program is required to convert the thermal disequilibrium data output by the transient code TRAC into equilibrium data in a format compatible with the input data required by the code CAIN which in turn produces input data for MABEL.

9873 **(BNL-NUREG—33988) Quality assurance of PTS thermal hydraulic calculations at BNL.** Rohatgi, U.S.; Pu, J.; Jo, J.; Saha, P. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 17p. (CONF-8310143—73). NTIS, PC A02/MF A01 - GPO. Order Number DE84004189.

From 11. NRC water reactor safety research information meeting; Gaithersburg, MD, USA (14 Oct 1983).

Rapid cooling of the reactor pressure vessel at high pressure has a potential of challenging the vessel integrity. This phenomenon is called overcooling or Pressurized Thermal Shock (PTS). The Nuclear Regulatory Commission (NRC) has selected three plants representing three types of PWRs in use for detailed PTS study. Oconee-1 (B and W), Calvert Cliffs (C.E.), and H.B. Robinson (Westinghouse). The Brookhaven National Laboratory (BNL) has been requested by NRC to review and compare the input decks developed at LANL and INEL, and to compare and explain the differences between the common calculations performed at these two laboratories. However, for the transients that will be computed by only one laboratory, a consistency check will be performed. So far only Oconee-1 calculations have been reviewed at BNL, and the results are presented here.

9874 **(CEA-CONF—6623) Transient fuel melting.** Roche, L.; Schmitz, F. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Oct 1982. 17p. (In French). (CONF-820985—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704124.

From 8. European conference on thermophysical properties - high temperatures high pressures; Baden-Baden, F.R. Germany (27 Sep 1982).

The observation of micrographic documents from fuel after a CABRI test leads to postulate a specific mode of transient fuel melting during a rapid nuclear power excursion. When reaching the melt threshold, the bands which are characteristic for the solid state are broken statistically over a macroscopic region. The time of maintaining the fuel at the critical enthalpy level between solid and liquid is too short to lead to a phase separation. A significant lifetime (approximately 1 second) of this intermediate "unsolide" state would have consequences on the variation of physical properties linked to the phase transition solid/liquid: viscosity, specific volume and (for the irradiated fuel) fission gas release.

9875 **(CEA-CONF—6627) Lessons learnt from the experience acquired on the operation of pressurized water reactors in the field of radiation protection.** Seveon, J.J.; Guirlet, J. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1981. 19p. (In French). (DSN—500; CONF-8105160—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704323.

From Seminar on the development of radioprotection techniques for nuclear energy workers; Cadarache, France (5 May 1981).

The experience gained on the first pressurized water reactors (Chooz Beznau) and the results of the experimental programme jointly developed by the CEA, EDF and FRAMATOME on the working branches of Fessenheim and Bugey have made it possible to evaluate the various sources of irradiation and contamination and to suggest actions for monitoring and reducing these sources. The deposits of corrosion products constitute the main source of personnel irradiation. Various actions are being taken to reduce these deposits, namely: reduction of the cobalt level in materials, electromagnetic filtration, defining the chemistry of the primary water minimizing corrosion, development of chemical and mechanical decontamination processes. The sources of internal contamination of personnel (halogens, aerosols, tritium) in the reactor containment have been asessed in normal operation and during reactor shutdown periods. Methods for the surveillance of the state of the 1st and 2nd barriers have been developed.

9876 **(CEA-CONF—6628) Determination of seismic reference motions on nuclear sites in France.** Levret, A.; Mohammadioun, B. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Aug 1982. 36p. (In French). (CONF-8208153—1). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704125.

From 18. meeting of the European Seismological Commission; Leeds, UK (23 Aug 1982).

For the assessment of seismic hazard on a site, the Nuclear Safety Department makes use a seismotectonic method which entails the definition of specific reference motions on each site. It includes two steps: 1. As thorough an analysis as possible of macroseismic data to define the characteristics (intensity, magnitude, focal distance) of reference earthquakes. 2. The calculation of ground motion from statistical study of strong motion records collected in a data bank. Particular attention has recently been drawn to determining the appropriate manner for taking nearby, low-magnitude earthquakes into account. The application of this method to an actual case (the july 15, 1980 Kembs earthquake) makes it possible to verify the validity of the method.

9877 **(CEA-CONF—6783) Development and qualification of the LOCA analysis system CUPIDON-DEMETER.** Houdaille, B.; Fillatre, A.; Morize, P. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 30p. (CONF-8305155—1). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750324.

From 4. specialists' meeting on water reactor fuel safety in off-normal and accident conditions; Risoe, Denmark (16 May 1983).

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As a support to the power reactor safety analysis, codes describing PWR-type fuel behaviour under LOCA conditions have been developed by CEA under the sponsorship of IPSN. These codes are CUPIDON for unirradiated single fuel rod and DEMETER devoted to the prediction of the behaviour of a whole assembly. An extensive qualification program is underway. The main models: heat transfer, zircaloy oxidation and cladding deformation and rupture, have been separately benchmarked using PHEBUS experiments, German and Japanese transient tests and EDGAR transient tests. Qualification with global tests FLASH and PHEBUS is now underway. From the first calculations, it is concluded that CUPIDON gives a fair account of the behaviour of the rods tested in FLASH and PHEBUS.

9878 **(CEA-R—5200) PHYSURA code - objectives, description, validation.** (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). May 1983. 104p. (In French). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750258.

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The Physura code has been developed by the "Section d'Interpretation des Essais de Surete" to interpret the Cabri experiments. It is a one channel code which calculates pin and channel behaviour during a loss of flow or an overpower transient. It describes the most important phenomena observed in the experiments: thermal and mechanical behaviour of the pin, sodium boiling, fuel and clad melting, fuel and clad movements, and the fuel-coolant interaction. A brief description of the code is given which precises the main hypothesis of the models. A comparison of calculated and experimental results gives an idea of the code validity. Finally the question of the application to the reactor case is discussed.

9879 **(CONF-821106—34) Development of a promising filtration method for liquid clarification in nuclear facilities.** Collins, E.D.; Knauer, J.B.; Byrd, L.A.; Ross, R.G.; Savage, H.C. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 22p. NTIS, PC A02/MF A01. Order Number DE84004387.

From Annual meeting of heat transfer and energy conversion (American Inst of Chemical Engineers); Los Angeles, CA, USA (14 Nov 1982).

Conclusions reached are that deep beds of diatomaceous earths are especially attractive for clarification of radioactive solutions, or slurries containing insoluble radioactive material, because the diatomaceous material provides a noncompressible medium that is retentive for a wide variety of particle sizes. Also, the diatomaceous material, because of its inorganic composition, is resistant to degradation by radiation from the retained particulate matter. Its silicious character is especially appropriate for conversion to vitrified or cement-type waste forms. This paper studied the use of diatoma-

ceous earth to filter synthetic TMI-2 water, reprocessing dissolver solutions, and zinc bromide solutions (hot-cell shielding).

9880 (CONF-821215—, pp 507-518) **Accident analysis and DOE criteria.** Graf, J.M.; Elder, J.C. (Los Alamos National Lab., NM). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

In analyzing the radiological consequences of major accidents at DOE facilities one finds that many facilities fall so far below the limits of DOE Order 6430 that compliance is easily demonstrated by simple analysis. For those cases where the amount of radioactive material and the dispersive energy available are enough for accident consequences to approach the limits, the models and assumptions used become critical. In some cases the models themselves are different between meeting the criteria or not meeting them. Further, in one case, it was found that not only did the selection of models determine compliance but the selection of applicable criteria from different chapters of Order 6430 also made the difference. DOE has recognized the problem of different criteria in different chapters applying to one facility, and has proceeded to make changes for the sake of consistency. Specific steps needed in an accident analysis are outlined and appropriate models, parameters, and assumptions are suggested. 13 references, 1 table. (JMT)

9881 (CONF-821215—, pp 527-539) **Dose projection considerations for emergency conditions at nuclear power plants.** Stoetzel, G.A.; Poeton, R.W.; Ramsdell, J.V.; Powell, D.C.; Desrosiers, A.E. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

This paper reviews the problems and issues associated with making environmental radiation dose projections during emergencies at nuclear power plants. The review is divided into three areas including source term development, characterization of atmospheric dispersion and selection of appropriate determining thyroid dose and whole body dose for ground level and elevated releases. Uncertainties associated with these calculations are also discussed. 25 references, 2 figures, 1 table.

9882 **(CONF-831047—91) Pretest predictions for degraded shutdown heat-removal tests in THORS-SHRS Assembly 1.** Rose, S.D.; Carbajo, J.J. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 8p. NTIS, PC A02/MF A01. Order Number DE84001980.

From American Nuclear Society winter meeting; San Francisco, CA, USA (30 Oct 1983).

The recent modification of the Thermal-Hydraulic Out-of-Reactor Safety (THORS) facility at ORNL will allow testing of parallel simulated fuel assemblies under natural-convection and low-flow forced-convection conditions similar to those that might occur during a partial failure of the Shutdown Heat Removal System (SHRS) of an LMFBR. An extensive test program has been prepared and testing will be started in September 1983. THORS-SHRS Assembly 1 consists of two 19-pin bundles in parallel with a third leg serving as a bypass line and containing a sodium-to-sodium intermediate heat exchanger. Testing at low powers wil help indicate the maximum amount of heat that can be removed from the reactor core during conditions of degraded shutdown heat removal. The thermal-hydraulic behavior of the test bundles will be characterized for single-phase and two-phase conditions up to dryout. The influence of interassembly flow redistribution including transients from forced- to natural-convection conditions will be investigated during testing.

9883 **(CONF-8309187—1) Leak rate measurements and detection systems.** Kupperman, D.; Shack, W.J.; Claytor, T. (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE84004036.

From CSNI leak-before-break conference; Monterey, CA, USA (1 Sep 1983).

A research program is under way to evaluate and develop improve leak detection systems. The primary focus of the work has been on acoustic emission detection of leaks. Leaks from artificial flaws, laboratory-generated IGSCCs and thermal fatigue cracks, and field-induced intergranular stress corrosion cracks (IGSCCs) from reactor piping have been examined. The effects of pressure, temperature, and leak rate and geometry on the acoustic signature are under study. The use of cross-correlation techniques for leak location and pattern recognition and autocorrelation for source discrimination is also being considered.

9884 **(EDF—82E119251) Seismic model of the nuclear boiler SPX2.** Christodoulou, K. (Electricite de France, 75 - Paris). Jan 1982. 46p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704126.

A model of the nuclear boiler SPX2 is proposed in this paper enabling to carry out comparative calculations on the response to seismic effects. The calculations are made in CISE and SEPTEN departments of Electricite de France.

9885 **(EGG-SAAM—6452) Parallel processing algorithms for hydrocodes on a computer with MIMD architecture (DENELCOR's HEP).** Hicks, D.L. (Idaho National Engineering Lab., Idaho Falls (USA)). Nov 1983. Contract AC07-76ID01570. 53p. NTIS, PC A04/MF A01. Order Number DE84004941.

In real time simulation/prediction of complex systems such as water-cooled nuclear reactors, if reactor operators had fast simulator/predictors to check the consequences of their operations before implementing them, events such as the incident at Three Mile Island might be avoided. However, existing simulator/predictors such as RELAP run slower than real time on serial computers. It appears that the only way to overcome the barrier to higher computing rates is to use computers with architectures that allow concurrent computations or parallel processing. The computer architecture with the greatest degree of parallelism is labeled Multiple Instruction Stream, Multiple Data Stream (MIMD). An example of a machine of this type is the HEP computer by DENELCOR. It appears that hydrocodes are very well suited for parallelization on the HEP. It is a straightforward exercise to parallelize explicit, one-dimensional Lagrangean hydrocodes in a zone-by-zone parallelization. Similarly, implicit schemes can be parallelized in a zone-by-zone fashion via an a priori, symbolic inversion of the tridiagonal matrix that arises in an implicit scheme. These techniques are extended to Eulerian hydrocodes by using Harlow's rezone technique. The extension from single-phase Eulerian to two-phase Eulerian is straightforward. This step-by-step extension leads to hydrocodes with zone-by-zone parallelization that are capable of two-phase flow simulation. Extensions to two and three spatial dimensions can be achieved by operator splitting. It appears that a zone-by-zone parallelization is the best way to utilize the capabilities of an MIMD machine. 40 references.

9886 **(EGG-TFBP—6279-Rev.1) PFB-CANDU Fuel Element LOCA Test experiment operating specification. Revision 1.** Martinson, Z.R.; McCormick, R.D. (EG and G Idaho, Inc., Idaho Falls (USA)). Nov 1983. Contract AC07-76ID01570. 63p. NTIS, PC A04/MF A01. Order Number DE84005029.

This document describes the experiment operating specifications for the PBF-CANDU Fuel Element LOCA Test to be conducted in the Power Burst Facility (PBF) at the Idaho National Engineering Laboratory (INEL). The PBF-CANDU Fuel Element LOCA Test is sponsored jointly by Ontario Hydro and Atomic Energy of Canada Limited (AECL). Objectives are to provide an in-reactor evaluation of CANDU fuel element thermal-mechanical behavior during a postulated loss-of-coolant accident, and provide an experimental data base for evaluation of the transient fuel behavior code, ELOCA.

9887 **(GEND-INF—037-Vol.5) Technical Assistance and Advisory Group, report number 5. Volume 5.** Hamilton, W.H. (EG and G Idaho, Inc., Idaho Falls (USA)). Dec 1983. Contract AC07-76ID01570. 182p. NTIS, PC A09/MF A01. Order Number DE84004467.

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This report is divided into the following sections: pyrophoricity of core debris during head removal; design studies for defueling and core sampling equipment to confirm design requirements;

resolution of TAAG comments for plenum removal and development of prerequisites; leadscrew samples; reactor building decontamination and characterization; use of tunnel concept and evaluation of alternatives; review of fuel transfer system design; evaluation of TMI-2 quick scan results; refueling canal cleanup systems; and man-REM reassessment.

9888 **(IAEA-TECDOC—278) Guide on a national system for collecting, assessing and disseminating information on safety-related events in nuclear power plants. A pre-publication working document.** (International Atomic Energy Agency, Vienna (Austria)). Feb 1983. 43p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704596.

There is a wide spectrum of safety significance in the events that can occur during nuclear power plant operations. It is important that lessons be learned from safety-related events (hereinafter referred to as unusual events) so as to improve the safety of nuclear power plants. Hence formal procedures should be established for this purpose. The purpose of this document is to provide guidance to Member States for establishing a system (hereinafter referred to as a national system) for collecting, storing, retrieving, assessing and disseminating information on unusual events in nuclear power plants. The guidance given is based on experience gained in the use of existing national and international systems. This guide covers a national system that is part of a programme to improve nuclear power plant safety using experience gained from operating plants both within and outside the country. Implementing the recommendations in this guide would render any national system compatible with other national systems and facilitate the participation in the IAEA System for Reporting Unusual Events with Safety Significance (hereinafter referred to as the IAEA Incident Reporting System, IAEA-IRS) for more widespread dissemination of lessons learned from nuclear power plant operation.

9889 **(IFE/KR/E—16N) Dependency models and probability of joint events.** Oerjasaeter, O. (Institute for Energy Technology, Kjeller (Norway)). Aug 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704571.

Probabilistic dependencies between components/systems are discussed with reference to a broad classification of potential failure mechanisms. Further, a generalized time-dependency model, based on conditional probabilities for estimation of the probability of joint events and event sequences is described. The applicability of this model is clarified/demonstrated by various examples. It is concluded that the described model of dependency is a useful tool for solving a variety of practical problems concerning the probability of joint events and event sequences where common cause and time-dependent failure mechanisms are involved.

9890 **(INIS-mf—8275) Accident analysis in the framework of emergency provisions. A study on the current state and further development of the accident analysis methods in the framework of the emergency provisions for nuclear power plants with light water moderated pressurized water reactor.** Tietze, A. (Wuppertal Univ. (Gesamthochschule) (Germany, F.R.). Fachbereich 14 - Sicherheitstechnik). Mar 1981. 278p. (In German). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83704752.

The first part of the report describes the demands on and bases of a reactor emergency plan and outlines the technical characteristics of a nuclear power plant with light-water moderated pressurized-water reactor with special regard to reactor safety. In the second part the failure and risk potentials of a pressurized-water plant are described and discussed. The third part is dedicated to a representation of the analytical method in a stricter sense, according to the current state of technology. Finally the current degree of effectiveness of the reactor accident analysis method is critically discussed and perspectives of future development are pointed out.

9891 **(INIS-mf—8285) Quality assurance in civil works for nuclear power plants - status report on behalf of the Federal Minister of the Interior. Final report 1982.** Boehm, W.; Fibier, W.; Klang, H.; Koch, K.; Streer, G. (Dyckerhoff und Widmann A.G., Muenchen (Germany, F.R.). Abt. Kernkraftwerksbau). Jul 1982. 249p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83704753.

This report describes the development and legal foundations; it also refers to the principles, organization, and responsibilities. The typical procedure of internal- and external control in construction applied to design and execution of safety related structures of NPP is explained. Construction and corresponding QA measures are shown for 5 work sections of the containment of NPP Grohnde. The final evaluation demonstrates that satisfactory QA is achieved by application of the regular QA practice used in German Civil Works.

9892 **(INIS-mf—8287) Situation of quality assurance for safety related buildings of nuclear power stations. Status report on behalf of the Federal Minister of the Interior. Final report 1982.** (Zerna - Schnellenbach, Ingenieursozietaet fuer Konstruktiven Ingenieurbau, Bochum (Germany, F.R.)). 1983. 285p. (In German). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83704754.

General aspects of quality assurance are discussed first. Reference is made to the legal principles of the construction decree of the State of Northrhine-Westphalia. The presently applied procedure for quality assurance can be regarded as being sufficient. The consultation of experts during all stages of the construction of the power station offers the possibility to take into account the state of science and technology at any time. In addition to the experts according to PARAGRAPH 20 of the Atomic Energy Act the licensing authorities reasonably engage an expert specialized on the construction of buildings. The structural analyses and the design documents have to be checked by a licensed examiner. Supervision (quality control) of building materials, structural parts and types of construction is performed on two levels: - Supervision carried out by the manufacturer, who has to prove the quality of his product by an orderly performance of quality control procedures based on statistical methods. - Supervision by authorized representatives, who guarantee the correct supervision of the manufacturer. The supervision by the manufacturer himself is of eminent importance. Only if this supervision is performed intensively, the limitation of the activities of authorized representatives to the degree described above is justified.

9893 (Juel-Conf—17, pp 43-61) **Nuclear energy and radiation risks.** Feldmann, A. Jan 1983. (In German). Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

In Benefits and risks of nuclear energy.

The dynamics of biological systems are often underestimated. If risk data, responsible for individual damage phenomenon, are evaluated from this aspect, it can be stated that the normal operation of a nuclear power plant, in view of the total population as well as the fate of the individual, is connected with a negligible risk.

9894 (Juel-Conf—17, pp 63-70) **Safety of nuclear power plants.** Borsch, P.; Muench, E. Jan 1983. (In German). Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

In Benefits and risks of nuclear energy.

Every nuclear power plant is able to live up to the demands to keep radiation doses during normal operations at the most unfavourable point in the neighborhood of less than 30 mrem/annually. This means that in reality radio-active stress on the population amounts to less than 1 mrem/annually. This figure includes all nuclear technological installations together, and is not applicable for simply one each reactor. Radiation emission is here less than 1% than natural radiation doses, and represents an impact on the environment, which is lower than that created by many other energy production methods.

9895 **(NUREG—0090-Vol.6-No.2) Report to Congress on abnormal occurrences, April-June 1983. Vol. 6, No. 2.** (Nuclear Regulatory Commission, Washington, DC (USA). Office for Analysis and Evaluation of Operational Data). Nov 1983. 34p. NTIS, PC A03/MF A01 - GPO. Order Number DE84900717.

Section 208 of the Energy Reorganization Act of 1974 identifies an abnormal occurrence as an unscheduled incident or event which the Nuclear Regulatory Commission determines to be significant from the standpoint of public health or safety and requires a quarterly report of such events to be made to Congress. This report covers the period from April 1 to June 30, 1983. The report states that for this report period, there was one abnormal occurrence at the nuclear power plants licensed by the NRC to operate. The event involved the unavailability of the auxiliary feedwater system. There were no abnormal occurrences for the other NRC licensees. There were three abnormal occurrences at Agreement State licensees. One involved an overexposure of two radiographers. The second involved a missing radioactive source. The third involved exposures to americium-241. The report also contains information updating some previously reported abnormal occurrences.

9896 **(NUREG—0485-Vol.5-No.10) Systematic evaluation program. Status summary report. Volume 5, No. 10.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). 31 Oct 1983. 72p. NTIS, PC A04/MF A01 - GPO. Order Number DE84900588.

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The Systematic Evaluation Program is intended to examine many safety-related aspects of 11 of the older light water reactors. This document provides the existing status of the review process including individual topic and overall completion status.

9897 **(NUREG—0519-Suppl.7) Safety evaluation report related to the operation of LaSalle County Station, Units 1 and 2, (Docket Nos. 50-373 and 50-374). Supplement No. 7.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Dec 1983. 66p. NTIS, PC A04/MF A01 - GPO $4.50. Order Number DE84900584.

Supplement No. 7 to the Safety Evaluation Report of Commonwealth Edison Company's application for a license to operate its La Salle County Station, Unit 2, located on Brookfield Township, La Salle County, Illinois, has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. This supplement is to update our evaluations on Unit 2 issues identified in the previous Safety Evaluation Report and Supplements that need resolution prior to issuance of the operating license for Unit 2.

9898 **(NUREG—0881-Suppl.4) Safety evaluation report related to the operation of Wolf Creek Generating Staton, Unit No. 1, (Docket No. STN 50-482). Supplement No. 4.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Dec 1983. 75p. NTIS, PC A04/MF A01 - GPO $4.50. Order Number DE84900582.

Supplement No. 4 to the Safety Evaluation Report related to the operation of the Wolf Creek Generating Station, Unit No. 1 updates the information contained in the Safety Evaluation Report, dated April 1982 and Supplements 1, 2, and 3, dated August 1982, June 1983 and August, 1983, respectively. Supplement No. 4 addresses open issues, confirmatory items and addresses Board Notifications. The Safety Evaluation and its supplements pertain to the application for a license to operate the Wolf Creek Generating Station, Unit No. 1 filed by Kansas Gas and Electric Company on February 19, 1980. The Construction Permit No. CPPR-147 was issued on May 17, 1977.

9899 **(NUREG—0892-Suppl.4) Safety evaluation report related to the operation of WPPSS Nuclear Project No. 2, (Docket No. 50-397). Supplement No. 4.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Dec 1983. 143p. NTIS, PC A07/MF A01 - GPO $5.50. Order Number DE84900580.

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Supplement No. 4 to the Safety Evaluation Report on the application filed by Washington Public Power Supply System for a license to operate the WPPSS Nuclear Project No. 2, located in Richland, Washington, has been prepared by the Division of Licensing, Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. This supplement reports the status of certain items that had not been resolved at the time of publication of the Safety Evaluation Report and Supplement Nos. 1, 2 and 3.

9900 **(NUREG—0991-Suppl.1) Safety evaluation report related to the operation of Limerick Generating Station, Units 1 and 2 (Docket Nos. 50-352-50-353). Supplement 1.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Dec 1983. 89p. NTIS, PC A05/MF A01 - GPO $4.75. Order Number DE84900594.

This report supplements the Safety Evaluation Report (NUREG-0991, August 1983) for the application filed by the Philadelphia Electric Company, as applicant and owner, for licenses to operate the Limerick Generating Station Units 1 and 2 (Docket Nos. 50-352 and 50-353). The facility is located near Pottstown, Pennsylvania. Subject to favorable resolution of the items discussed in this report, the NRC staff concludes that the facility can be operated by the applicant without endangering the health and safety of the public.

9901 **(NUREG—1002) Safety evaluation report related to the operation of Braidwood Station, Units 1 and 2 (Docket Nos. 50-456 and 50-457).** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Nov 1983. 185p. NTIS, PC A09/MF A01 - GPO $6.00. Order Number DE84900691.

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The Safety Evaluation Report for the application filed by the Commonwealth Edison Company, as applicant and owner, for a license to operate Braidwood Station, Units 1 and 2 (Docket Nos. STN 50-456 and STN 50-457), has been prepared by the Office of Nuclear Reactor Regulation of the US Nuclear Regulatory Commission. The facility is located in Reed Township, Will County, Illinois. Subject to favorable resolution of the items discussed in this report, the staff concludes that the facility can be operated by the applicant without endangering the health and safety of the public.

9902 **(NUREG—1004) Safety evaluation report related to steam generator repair at H.B. Robinson Steam Electric Plant, Unit No. 2. Docket No. 50-261.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Nov 1983. 47p. NTIS, PC A03/MF A01 - GPO $4.25. Order Number DE84900581.

A Safety Evaluation Report was prepared for the H.B. Robinson Steam Electric Plant Unit No. 2 by the Office of Nuclear Reactor Regulation. This report considers the safety aspects of the proposed steam generator repair at H.B. Robinson Steam Electric Plant Unit No. 2. The report focuses on the occupational radiation exposure associated with the proposed repair program. It concludes that there is reasonable assurance that the health and safety on the public will not be endangered by the conduct of the proposed action, such activities will be conducted in compliance with the Commission's regulations, and the issuance of this amendment will not be inimical to the common defense and security or the health and safety of the public.

9903 **(NUREG—1038) Safety evaluation report related to the operation of Shearon Harris Nuclear Power Plant, Units 1 and 2. Docket Nos. STN 50-400 and STN 50-401.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation). Nov 1983. 602p. NTIS, PC A99/MF A01 - GPO $11.00. Order Number DE84900592.

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The Safety Evaluation Report for the application filed by the Carolina Power and Light Company, as applicant and owner, for licenses to operate the Shearon Harris Nuclear Power Plant Units 1 and 2 (Docket Nos. 50-400 and 50-401) has been prepared by the Office of Nuclear Reactor Regulation of US Nuclear Regu-

latory Commission. The facility is located near Raleigh, North Carolina. Subject to favorable resolution of the items discussed in this report, the NRC staff concludes that the facility can be operated by the applicant without endangering the health and safety of the public.

9904 **(NUREG/CP—0045-Vol.2) Third Japan-US seminar on HTGR safety technology: proceedings. Volume II.** (Brookhaven National Lab., Upton, NY (USA)). 1982. Contract AC02-76CH00016. 408p. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2). NTIS, PC A18/MF A01 - GPO. Order Number DE84000513.

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

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Separate abstracts were prepared for the papers presented in the following areas; Materials; Fuel and Fission Products; and Structural.

9905 (NUREG/CP—0045-Vol.2, pp 542-553) **Effect of reactor temperature on fission product release in the experimental VHTR.** Okamoto, F. (Fuji Electric Co., Ltd., Tokyo, Japan); Mitake, S. 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Analysis on behavior of fission product in the experimental VHTR plant has been carried out to examine intensively the effect of core temperature. In this analysis, the core averaged fission product release fraction of various kinds of fission product is prepared by a newly developed computer code, FPCORE. In this code, core temperature and power distributions can be taken into account using the fission product release data from the coated fuel particle (cfp) and the barrier effect of fuel sleeve at each temperature. Fission product release fractions from the core for different core temperatures are calculated by FPCORE code. The results of analysis indicate that the amount of metallic fission product into the primary circuit increases rapidly at the higher core temperature. This suggests that the retention of metallic fission product in cfp must be investigated for higher core temperature.

9906 (NUREG/CP—0045-Vol.2, pp 554-562) **High temperature migration of uranium - thorium mixtures in H451 graphite.** Uneberg, G.O.; Sastre, C.A. (Brookhaven National Lab., Upton, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

High temperature (~ 3000°C) diffusion profiles have been obtained for UC_2 and ThC_2 mixtures in H451 graphite. Several diffusion coefficients have been inferred and they range from 1.4 x 10^{-4} to 6.4 x 10^{-4} cm^2/sec.

9907 (NUREG/CP—0045-Vol.2, pp 594-609) **Gas-phase transport of fission products.** Tang, I.N.; Munkelwitz, H.R. (Brookhaven National Lab., Upton, NY). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

The paper presents the results of an experimental investigation to show the importance of nuclear aerosol formation as a mechanism for semi-volatile fission product transport under certain postulated HTGR accident conditions. Simulated fission product Sr and Ba as oxides are impregnated in H451 graphite and released at elevated temperatures into a dry helium flow. In the presence of graphite, the oxides are quantitatively reduced to metals, which subsequently vaporize at temperatures much lower than required for the oxides alone to vaporize in the absence of graphite. A substantial fraction of the released material is associated with particulate matter, which is collected on filters located downstream at ambient temperatures. Increasing carrier-gas flow rate greatly enhances the extent of particulate transport. The release and transport of simulated fission product Ag as metal are also investigated. Electron microscopic examinations of the collected Sr and Ag aerosols show large agglomerates composed of primary particles roughly 0.06 to 0.08 μm in diameter.

9908 **(NUREG/CR—3096) Review of the Byron/Braidwood Units 1 and 2 auxiliary feedwater system reliability analysis.** Youngblood, R.; Papazoglou, I.A. (Brookhaven National Lab., Upton, NY (USA)). Nov 1983. Contract AC02-76CH00016. 53p. (BNL-NUREG—51633). NTIS, PC A04/MF A01 - GPO $4.00. Order Number DE84004652.

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This report presents the results of a review of the Auxiliary Feedwater System Reliability Analysis for Byron Units 1 and 2/ Braidwood Units 1 and 2. The objective of this report is to estimate the probability that the Auxiliary Feedwater System will fail to perform its mission for each of three different initiators: (1) loss of main feedwater with offsite power available, (2) loss of offsite power, (3) loss of all 460 VAC power. The scope, methodology, and failure data are prescribed by NUREG-0611, Appendix III. The results are compared with those obtained in NUREG-0611 for other Westinghouse plants.

9909 **(NUREG/CR—3407) Light Water Reactor Safety Research Program. Semiannual report, April-September 1982.** Berman, M. (Sandia National Labs., Albuquerque, NM (USA)). Oct 1983. Contract AC04-76DP00789. 242p. (SAND—83-1576). NTIS, PC A11/MF A01 - GPO. Order Number DE84004268.

This report documents progress made in Light Water Reactor Safety research conducted by Division 6441 in the period from April 1982 to September 1982. The programs conducted under investigation include Core Concrete Interactions, Core Melt-Coolant Interactions, Containment Emergency Sump Performance, the Hydrogen Program, and Combustible Gas in Containment Program. 50 references.

9910 **(NUREG/CR—3480) USI A-40 value/impact assessment.** Coats, D.W. Jr.; Lappa, D.A. (Lawrence Livermore National Lab., CA (USA)). Nov 1983. Contract W-7405-ENG-48. 132p. (UCRL—53489). NTIS, PC A07/MF A01 - GPO. Order Number DE84005435.

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The Committee to Review Generic Requirements (CRGR) has the responsibility to review all proposed new regulatory requirements and recommended approval or disapproval to the Executive Director of Operations. Proposed new requirements submitted to the CRGR must be accompanied by written justification. This justification package must be accompanied by written justification. This justification package must include (among other things) an assessment of the risk reduction expected from implementing the proposed requirement and an estimate of the costs to the NRC and the licensees. This report provides technical support to the Generic Issues Branch (GIB) in preparing value/impact assessments of proposed new regulatory requirements to Standard Review Plan (SRP) sections 3.7.1, 3.7.2, and 3.7.3, dealing with seismic design criteria. The technical issues involved and the potential benefits and impact of the new proposed change on seismic response and risk are qualitatively discussed and quantitatively assessed (where possible) through the use of engineering judgement, experience data, and recent research, but not through the explicit use of seismic PRA calculations. A total of 24 proposed changes were identified. Of these new requirements, 14 were identified as having a potential impact on PRA results.

9911 **(NUREG/CR—3492-Vol.2) High-temperature gas-cooled reactor safety studies for the Division of Accident Evaluation. Quarterly progress report, April 1-June 30, 1983. Volume 2.** Ball, S.J.; Cleveland, J.C.; Harrington, R.M.; Lindemer, T.B.; Siman-Tov, I. (Oak Ridge National Lab., TN (USA)). Jan 1984. Contract W-7405-ENG-26. 22p. (ORNL/TM—8921-Vol.2). NTIS, PC A02/MF A01 - GPO. Order Number DE84004789.

Work on postulated severe accident sequence code development and application continued both for the Fort St. Vrain and 2240-MW(t) lead plant designs. Initial experiments on high-temperature gas-cooled reactor (HTGR) fission-product release and trans-

port were run in an existing high-temperature (> 2000°C) graphite-resistance furnace. Initial work was done on a cooperative study of HTGR safety research needs.

9912 **(PNL-SA—11617) Suppression pool modeling.** Owczarski, P.C.; Postma, A.K. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 34p. (CONF-8310143—52). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84003351.

From 11. NRC water reactor safety research information meeting; Gaithersburg, MD, USA (14 Oct 1983).

Boiling water reactors in the United States are built with a safety feature, a suppression pool, designed to condense steam released during an accident. In a severe accident aerosols can be formed during core melt and can be formed from the interaction of the concrete basemat and the molten core. A suppression pool has the capability to capture a significant fraction of these aerosols. This paper briefly mentions the mechanisms of particle capture and the mechanisms hindering particle capture. However, the primary purpose of this paper is to discuss the quantitative sensitivity of the controlling parameters that could have an impact on accident analyses or in the design of experiments for code validation. The SPARC parameters addressed here in descending order of importance are: particle size, bubble size, bubble shape, fraction of steam in inlet gas, particle density, pool temperature, pool depth, percent soluble material in particles, noncondensible gas composition and pressure above the pool. Another parameter that could be extremely important is water purity. The presence of trace quantities of surfactants could significantly reduce the particle capture capabilities of the pool.

9913 **(RCG—8210/8213) Small scale studies of production of fissium aerosols.** Lindqvist, O.; Rydberg, J. (Radiochemistry Consultant Group, Vaestra Froelunda (Sweden)). Feb 1983. 64p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704535.

A small scale study concerning the production and analysis of fission product aerosols formed at various temperatures as a function of the chemical composition of the fissium/corium mixture at the source is presented. CsOH, CsJ and Te are the main aerosol components to be expected. The thermodynamic characterization of occuring Te-iodides and other phases is of great importance for reactor core meltdown chemistry and for the evaluation of the aerosol transport tests. Elemental iodine seems not to be released in significant amounts in reducing atmosphere. Analysis data concerning elements, phases, themral analysis and gases are presented.

9914 **(SAND—83-1910C) CONTAIN calculations of severe accident sequences at the Surry Nuclear Power Plant.** Tills, J.L.; Murata, K.K.; Williams, D.C. (Tills (Jack) and Associates, Inc., Albuquerque, NM (USA); Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 16p. (CONF-8310143—49). NTIS, PC A02/MF A01. Order Number DE84003210.

From 11. NRC water reactor safety research information meeting; Gaithersburg, MD, USA (14 Oct 1983).

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CONTAIN is an integrated containment thermohydraulic and aerosol transport code. The choice of the Surry plant provides an opportunity to compare the CONTAIN calculations to those recently performed by Battelle Columbus Laboratories. The accident sequence considered consists of a loss of coolant accident due to a large pipe break in the hot leg, followed by a failure of electric power to all engineered safety features including the emergency core cooling system. Pressure history calculations are shown. Suspended masses of the various aerosol components are shown as a function of time. Airborne masses of Cs and I within the containment are also shown. In contrast to the results reported by Battelle the containment atmosphere in the CONTAIN calculations remained superheated during and after the generation of the highly radioactive aerosols; hence, steam condensation on these aerosols could not occur. It was found that single-cell representation of containment can be a serious oversimplification. For the Surry accident sequence decay heat associated with suspended fusion products does not have significant effects on the release fractions.

9915 **(UCID—19958) Study of parameters important to soil-structure interaction in seismic analyses of nuclear power plants.** Nelson, T.A. (Lawrence Livermore National Lab., CA (USA)). Dec 1983. Contract W-7405-ENG-48. 218p. NTIS, PC A10/MF A01. Order Number DE84005061.

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The development of state-of-the-art techniques for analyzing the effects of soil-structure interaction (SSI) on structures during earthquakes is outlined. Emphasis is placed on methods to account for energy dissipation as a result of both wave propagation away from the structure's foundation and hysteretic soil response. Solution techniques are grouped into two major types: substructure methods, which break the problem into a series of steps; and direct methods, which analyze the soil-structure model in one step. In addition to theoretical and historical development of SSI methodology, case studies are presented illustrating the application of these solution techniques. 94 references.

9916 **(UCRL—86245-Rev.1) Probability problems in seismic risk analysis and load combinations for nuclear power plants.** George, L.L. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 10p. (CONF-830889—1-Rev.1). NTIS, PC A02/MF A01. Order Number DE84004408.

From NATO Advanced Study Institute on statistical extremes and applications; Vimeiro, Portugal (31 Aug 1983).

This paper describes seismic risk, load combination, and probabilistic risk problems in power plant reliability, and it suggests applications of extreme value theory. Seismic risk analysis computes the probability of power plant failure in an earthquake and the resulting risk. Components fail if their peak responses to an earthquake exceed their strengths. Dependent stochastic processes represent responses, and peak responses are maxima. A Boolean function of component failures and survivals represents plant failure. Load combinations analysis computes the cdf of the peak of the superposition of stochastic processes that represent earthquake and operating loads. It also computes the probability of pipe fracture due to crack growth, a Markov process, caused by loads. Pipe fracture is an absorbing state. Probabilistic risk analysis computes the cdf's of probabilities which represent uncertainty. These Cdf's are induced by randomizing parameters of cdf's and by randomizing properties of stochastic processes such as initial crack size distributions, marginal cdf's, and failure criteria.

9917 **Experimental damping data for dynamic analyses of nuclear power plant piping systems.** (EG & G Idaho, Inc., Idaho Falls, ID). *American Society of Mechanical Engineers, Pressure Vessels and Piping Division,* [*Technical Report*] *PVP;* **PVP-VOL 73**: 133-150(1983). (CONF-830607—).

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

A summary of damping values reported in some recent piping system damping experiments and best estimate values for those systems is presented. The majority of the data is from tests conducted at the Heissdampfreaktor (HDR) in the Federal Republic of Germany. Data from the Kuosheng plant (Taiwan) and the LaSalle and Indian Point plants (U.S.) are also included. From the data surveyed, the most significant influence on damping was the type of supports used. Other influential parameters were excitation level and response frequency. Remaining effects were minor or could not be determined from the available data. Rayleigh curve fits generally represent the data adequately and can be used in many structural codes. The USNRC Regulatory Guide 1.61 recommended damping values are shown to provide a conservative lower bound to the best estimate values reported, especially at frequencies below 20 Hz, for systems supported by seismic restraints.

9918 **Dynamic simulation of Z-Bend and comparison with experimental data.** Bezler, P.; Subudhi, M. (Brookhaven National Laboratory, Upton, NY). *American Society of Mechanical Engineers, Pressure Vessels and Piping Division,* [*Technical Report*] *PVP;* **PVP-VOL. 73**: 179-188(1983). (CONF-830607—).

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

The ongoing program for benchmark computer methods used to design and qualify nuclear piping has been expanded to the consideration and use of physical test results. In the first evaluation, the capability of the linear elastic piping code, PSAFE2, was undertaken to predict the response of a simple planar piping configuration, tested by others, designated for the 'Z-bend'. The time history solution was developed using the modal superposition method and considering independent support excitations. The results include acceleration and displacement time history responses of all interior points. Both the inertia and pseudostatic responses are included. Comparisons are made between the measured and predicted time history results for selected points in the system. The overall agreement was found to be good and a discussion of discrepancies between the results is presented in the paper.

9919 **Seismic analysis of a nonlinear airlock door system.** Huang, S.N. (Westinghouse Manford Company, Richland, WA). *American Society of Mechanical Engineers, [Paper];* **83-PUP-48**: 7(1983). (CONF-830607—).

From American Society of Mechanical Engineers pressure vessel and piping conference; Portland, OR, USA (19 Jun 1983).

The containment equipment airlock door of the Fast Flux Test Facility utilizes screw-type actuators as a push-pull mechanism for closing and opening operations. Special design features were used to protect these actuators from pressure differential loading. These made the door behave as a nonlinear system during a seismic event. Seismic analyses, utilizing the time history method, were conducted to determine the seismic loads on these screw-type actuators. Several sizes of actuators were examined. Procedures for determining the final optimum design are discussed in detail.

9920 **Effect of interfacial shear and entrainment models on flooding predictions.** Popov, N.K.; Rohatgi, U.S. (Department of Nuclear Energy, Brookhaven National Laboratory, Upton, NY). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **79**: No. 225, 190-199(1983).

The counter-current annular flow in vertical pipes and its limitation, namely flooding, is important for the operation of Emergency Core Cooling Systems in LWR Nuclear Reactors, as well as in other physical situations. In this paper an analysis has been developed for adiabatic, steady-state, one-dimensional, air-water flow to predict flooding phenomenon. The formulation consists of separated flow analysis of the film and gas-droplet mixture in the pipe. The droplet phase of the pipe core is treated with a drift-flux model. Many correlations for interfacial shear, entrainment inception and rate, available in the literature, have been used in this analysis. Futhermore, recent versions of TRAC-PF1 and RELAP5/MOD1, along with the present analysis, have been applied to model University of Houston counter-current flow tests. The effects of various constitutive relationships have been compared. Some suggestions for model improvement have also been given.

9921 **Results of scoping tests in corium-water thermal interactions in ex-vessel geometry.** Spencer, B.W.; McUmber, L.; Sehgal, B.R.; Sienicki, J.J.; Squarer, D. (Argonne National Laboratory, Argonne, IL). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **79**: No. 225, 268-277(1983).

Results of scoping tests are reported which were performed in the ANL/EPRI Corium Ex-vessel interactions (COREXIT) Facility located at ANL. These tests are examining issues related to containment loading (i.e., steam generation, H_2 production, and debris dispersal) for hypothetical LWR accidents that are postulated to progress to the point of molten corium breaching the vessel bottom head and entering the reactor cavity. The geometry selected for these tests is a 1 : 30 linear scale of the Zion PWR containment design in which the cavity is connected to the containment volume by an open tunnel through which pass the in-core detector guide tubes. The effects of the corium-water mixing modes were investigated in the first two tests in the series. In test CWTI-1 the molten corium was ejected into water which filled the cavity mockup volume to one-half the passageway height. In CWTI-2, the molten corium was dropped atop the refractory base in the cavity mockup without the presence of water, and water was injected atop the corium melt immediately afterward as per accumulator discharge. These tests have shown significant differences in fuel fragmentation, steam generation rate, hydrogen production, and fuel dispersal. Particularly noteworthy was the significant amount of dispersal of both water and corium debris from the cavity mockup due to the initially rapid steam generation rate in CWTI-1.

9922 **LMFBR design for safety and proliferation resistance, with excellent performance.** Fischer, G.J.; Kouts, H.J.C.; Cerbone, R.J.; Atefi, B.; Durston, C. (Brookhaven National Lab., Upton, NY (USA)); Galperin, A. (Ben-Gurion Univ. of the Negev, Beersheba (Israel)). pp 213-217 of Fast reactor fuel cycles - proceedings of an international conference organized by the British Nuclear Energy Society and co-sponsored by the Royal Society of Chemistry and the Institution of Metallurgists. London, England; Thomas Telford Ltd. (1982). (CONF-811154—).

From International conference on fast reactor fuel cycles; London, UK (9 Nov 1981).

A carbide-fueled LMFBR has been designed with emphasis on performance and safety. A one-batch fuel loading can operate on a six year fuel cycle with small variations in local power density and with minor variations in reactivity. The design employs distributed subassemblies of beryllium oxide in the inner core and a somewhat reduced average core power density. The beryllium oxide allows control of regional conversion ratios, lowers local fissile enrichment, reduces fluence damage to steel, reduces sodium void and enhances the Doppler effect feedback. Two design options are described and results are presented.

9923 **Status and validation of the SAS4A accident analysis code system.** Wider, H.U.; Bordner, G.L.; Birgersson, G. (Argonne National Laboratory, IL (USA)) (and others). pp 13-23 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The SAS4A code system is a new tool for analyzing the initial phase of Hypothetical Core Disruptive Accidents (HCDAs) up to gross melting or failures of the subassembly walls. The objective in the development of SAS4A is to provide improved analytical models which represent experimentally demonstrated modes of material response in such accident scenarios. This paper discusses recent improvements in the phenomenological models, gives examples of verification and validation efforts that have been conducted, and illustrates the whole core analysis implications of using this refined modeling capability.

9924 **SIMMER as a safety analysis tool.** Smith, L.L.; Bell, C.R.; Bohl, W.R.; Bott, T.F.; Dearing, J.F.; Luck, L.B. (Los Alamos National Laboratory, N.M. (USA)). pp 35-44 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

SIMMER has been used for numerous applications in fast reactor safety, encompassing both accident and experiment analysis. Recent analyses of transition-phase behavior in potential core disruptive accidents have integrated SIMMER testing with the accident analysis. Results of both the accident analysis and the verification effort are presented as a comprehensive safety analysis program.

9925 **LMFBR system-wide transient analysis: the state of the art and U.S. validation needs.** Khatib-Rahbar, M.; Guppy, J.G.; Cerbone, R.J. (Brookhaven National Laboratory, Upton, N.Y. (USA)). pp 67-76 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

This paper summarizes the computational capabilities in the area of liquid metal fast breeder reactor (LMFBR) system-wide transient analysis in the United States, identifies various numerical and physical approximations, the degree of empiricism, range of applicability, model verification and experimental needs for a wide

class of protected transients, in particular, natural circulation shutdown heat removal for both loop- and pool-type plants.

9926 **PFR/TREAT programme: objectives, progress and future work.** Cowking, C.B. (UKAEA, Risley, Warrington (UK)); Alter, H. (USDOE, Germantown, WA (USA)); Hewison, R. (UKAEA, Dounreay (UK)); Borys, S.S.; Klickman, A.E.; Hill, D.J. (ANL, Argonne, IL (USA)); Wood, M.H. (UKAEA, Harwell (UK)); Culley, G.E. (HEDL, Richland WA (USA)); Woods, W.J. (UKAEA, Winfrith (UK)). pp 103-112 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The PFR/TREAT collaborative programme of fast reactor fuel testing is described and the objectives are illustrated in terms of the parameters selected for the irradiation of US and UK full length fuel pins in PFR, followed by safety testing in TREAT. The measurements being made before, during and after testing are outlined and the equipment and facilities being used in the UK and USA are described. An outline is given of the progress made and results obtained since the beginning of the collaboration in November 1979, together with future schedules for irradiation and testing. More detailed results from the first two tests are given in a companion paper.

9927 **TRAN experiment series in the SANDIA ACRR facility.** McArthur, D.A.; Hayden, Nancy; Duliere, S.F. (Sandia National Laboratories, Albuquerque, NM (USA)). pp 133-141 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The freezing and plugging behavior of pure molten UO_2 in small-diameter steel channels has been studied, using a pulsed reactor (the Sandia ACRR) to melt the fuel. This experiment series, TRAN, used pure reactor materials, upward melt injection, higher melt temperatures, and much lower driving pressures than previous simulant experiments. Stable fuel crust formation was observed for steel temperatures below 950 K, but complex fuel/steel entrainment phenomena were observed at higher temperatures. New modelling approaches are being investigated to describe those phenomena which are not explained by any current models.

9928 **Review of recent ANL safety experiments in SLSF and TREAT.** Klickman, A.E.; Thompson, D.H.; Ragland, W.A.; Wright, A.E.; Palm, R.G.; Page, R.J. (Argonne National Laboratory, Argonne, IL (USA)). pp 153-161 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Among the recent significant in-pile experiments conducted by ANL are Sodium Loop Safety Facility (SLSF) experiment P4 in the Engineering Test Facility (ETR) and TREAT experiments F3, F4 and J1. The P4 experiment, which had three heat-generating flow blockages each installed in six coolant channels in a 37-pin bundle of FTR (Fast Test Reactor)-type fuel elements, investigated the bounding consequences of severe local faults. The principal objectives were to eject molten fuel into the bundle geometry and, during subsequent extended operation, to characterize the behavior of (and response of instrumentation to) any subsequent blockage growth; secondary objectives included characterizing the severity of any molten-fuel/coolant interaction and the response of the coolant. The F3 and F4 experiments in TREAT were phenomenological tests to study the fuel column disruption mode in loss-of-flow accidents. The J1 experiment was the first slow period (approximately 10s) transient overpower experiment done in TREAT. Results of these experiments will be presented.

9929 **Safety related experience in FFTF startup and operation.** Peterson, R.E.; Halverson, T.G.; Daughtry, J.W. (Westinghouse Hanford Company, Richland, WA (USA)). pp 191-201 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The Fast Flux Test facility (FFTF) is a 400 MWt sodium cooled fast reactor operating at the Hanford Engineering Development Laboratory, Richland, Washington, to conduct fuels and materials testing in support of the U.S. LMFBR program. Startup and initial power ascension testing of the facility involved a comprehensive series of readiness reviews and acceptance tests, many of which relate to the inherent safety of the plant. Included are physics measurements, natural circulation, integrated containment leakage, shielding effectiveness, fuel failure detection, and plant protection system tests. Described are the measurements taken to confirm the design safety margins upon which the operating authorization of the plant was based. These measurements demonstrate that large margins of safety are available in the FFTF design.

9930 **Optimization of the man-machine interface for LMFBRs.** Seeman, S.E.; Colley, R.W.; Stratton, R.C. (Westinghouse Hanford Company, Richland, WA (USA)). pp 203-212 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

An effort is underway to optimize the roles of man and machine in control of Liquid Metal Fast Breeder Reactors. The work reported on here describes two systems that have been developed. The first of these, MIDAS, is a large data base system developed for use at FFTF as an aid to operators in determining how to proceed with maintenance and repairs to be carried out on plant components. This system is presently in use at FFTF. The second system, the Procedure Prompting System, is a system being developed to demonstrate a new methodology for automatically generating off-normal plant recovery instructions. The methodology for this system has been demonstrated on a model of a small subsystem of FFTF.

9931 **U.S. liquid metal fast breeder reactor man-machine interface program.** Vaurio, J.K.; Chang, S.A. (Argonne National Laboratory, IL (USA)). pp 243-250 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

The U.S. LMFBR Man-Machine Interface Program is supportive to and an integral part of the LMFBR Safety Program. This paper describes the goal and objectives of the program, and the necessary research and development efforts with a logical structure for the orderly and timely implementation of the program. Current status and near-term and long-term priority activities are also summarized.

9932 **Transient testing of the FFTF for decay heat removal by natural convection.** Beaver, T.R.; Johnson, H.G.; Stover, R.L. (Westinghouse Hanford Company, Richland, WA (USA)). pp 525-534 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

This paper reports on the series of transient tests performed in the FFTF as a major part of the pre-operations testing program. The structure of the transient test program was designed to verify the capability of the FFTF to safely remove decay heat by natural convection. The series culminated in a scram from full power to complete natural convection in the plant, simulating a loss of all electrical power. Test results and acceptance criteria related to the verification of safe decay heat removal are presented.

9933 Containment features for the 1000MWe LMFBR large developmental plant. Goodman, L.; Golan, S.; May, G.W. (Bechtel Group, Inc., San Francisco, CA (USA)); Longenecker, J.R.; Stader, J.E. (Department of Energy, Washington, DC (USA)). pp 761-770 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Containment design alternatives for a 1000Mwe LMFBR Large Developmental Plant were evaluated during the conceptual design studies sponsored by the U.S. Department of Energy (DOE). These alternatives were evaluated for their potential to mitigate the effects on the containment of a beyond the design basis accident. This accident was assumed to follow a hypothetical core melt. Some accommodation criteria are suggested and three mitigation concepts are described. The concepts are evaluated with respect to the suggested criteria. The analytical results show the potential mitigation available with these concepts for the Large Developmental Plant configuration and conditions.

9934 Analysis of recent fuel disruption experiments. Kramer, J.M.; Kraft, T.E.; Dimelfi, R.J.; Fenske, G.R.; Gruber, E.E. (Argonne National Laboratory, IL (U.S.A.)). pp 143-152 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Recent USDOE-Sponsored DEH, FGR, and TREAT F series fuel disruption experiments are analyzed with existing analytical models. The experiments are interpreted and the results used to evaluate the models. Calculations are presented using the FRAS3 fission gas behavior code and the DiMelfi-Deitrich fuel response model.

9935 Consequences of axial midplane failures during hypothetical transient overpower accidents. Padilla, A. Jr.; O'Dell, L.D.; Yung, S.C.; Wilburn, N.P.; Culley, G.E.; Waltar, A.E. (Westinghouse Hanford Company, Richland, WA (USA)). pp 139-148 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 4. Paris, France; SFEN (1982). (CONF-820704—Vol.4).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

It is generally accepted that coherent fuel pin failures at the axial midplane during hypothetical transient overpower accidents can cause a superprompt-critical excursion leading to an energetic core disassembly. Two approaches can be taken to resolve the concern of axial midplane failures. The first approach is to determine the distribution of fuel pin failure locations throughout the core. The second approach is to demonstrate that even if all the fuel pin failures occurred at the axial midplane, there are physical mechanisms and phenomena which will mitigate the consequences. This latter approach was taken in this paper to demonstrate that inter- and intra-assembly incoherence effects are likely sufficient to prevent an energetic accident consequence. Of the several sources of intra-assembly incoherence within the fuel bundle, one of these sources, the power and flow variations within the fuel bundle, was used to predict the time incoherence of fuel pin failures. The intra-assembly failure incoherence results were then used in a whole-core analysis of a 10c/s hypothetical transient overpower accident in the 2550 MWt LDP heterogeneous core. Taking into account intra-assembly failure incoherence, a superprompt-critical excursion was avoided and neutronic shutdown was obtained along with the prospect for adequate post-accident cooling of the damaged assemblies.

9936 SIMMER analysis of SRI postdisassembly expansion experiments. Bott, T.F.; Bell, C.R. (Los Alamos National Laboratory, NM (USA)). pp 149-158 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 4. Paris, France; SFEN (1982). (CONF-820704—Vol.4).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

Calculations of simulated postdisassembly expansions with SIMMER-II are compared to experimental data. The main features of the fluid motion are reproduced accurately. Good agreement is achieved for the important parameters of kinetic energy and impulse imparted to the vessel head. The most important calculated results are shown to be relatively insensitive to numerical modeling variations and uncertainties in many physical parameters. The geometric configuration of the upper internal structures is shown to affect significantly the vessel head impact energy and impulse.

9937 Phenomenological studies of HCDA issues. Spencer, B.W.; Cho, D.H. (Argonne National laboratory, IL (USA)). pp 159-168 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 4. Paris, France; SFEN (1982). (CONF-820704—Vol.4).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

A framework for examining whole-core accident phenomena during the time interval beginning with loss-of-intact geometry up to the time of post-accident heat removal is presented in terms of four distinct stages of disruption: disruption initiation, meltout stage, integral pool stage and termination stage. Each of the accident stages is further described in terms of four characteristic categories of phenomena which comprise the principal generic issues being studied: the failure of restraining boundaries, fuel dispersal, fuel-coolant thermal interactions, and fuel (pool) behavior with continued fission/decay heating. Current programs of out-of-pile experiments and related modeling addressing these issues at ANL are described.

9938 Uncertainty estimates for predictions of the impact of breeder reactor radionuclide releases. Miller, C.W.; Little, C.A. (Oak Ridge National Laboratory, TN (USA)). pp 645-654 of Proceedings of the L.M.F.B.R. safety topical meeting. Vol. 2. Paris, France; SFEN (1982). (CONF-820704—Vol.2).

From International topical meeting on LMFBR safety; Lyon, France (18 Jul 1982).

This paper summarizes estimates, compiled in a larger report, of the uncertainty associated with models and parameters used to assess the impact on man of radionuclide releases to the environment by breeder reactor facilities. These estimates indicate that, for many sites, generic models and representative parameter values may reasonably be used to calculate doses from annual average radionuclide releases when these calculated doses are on the order of one-tenth or less of a relevant dose limit. For short-term, accidental releases, the uncertainty in the dose calculations may be much larger than an order of magnitude. As a result, it may be necessary to incorporate site-specific information into the dose calculation under such circumstances. However, even using site-specific information, inherent natural variability within human receptors and transport processes, and the uncertainties in the dose conversion factor will likely result in an overall uncertainty of greater than an order of magnitude for predictions of dose following short-term releases.

9939 HTGR safety research at the Los Alamos National Laboratory. Stroh, K.R.; Anderson, C.A.; Kirk, W.L. (Los Alamos National Lab., NM (USA)). pp 1-6 of Gas-cooled reactors today (Vol. 3). Performance and safety technology. Status of gas-cooled reactors. Proceedings of the conference held in Bristol on 20-24 September 1982. London, England; British Nuclear Energy Society (1982). (CONF-820915—Vol.3).

From BNES international conference on gas cooled reactors today; Bristol, UK (20 Sep 1982).

A summary is given of activities undertaken at the Los Alamos National Laboratory as part of the High-Temperature Gas-Cooled Reactor Safety Research Program sponsored by the US Nuclear Regulatory Commission. Technical accomplishments and analysis capabilities in six broad-based task areas are described. These tasks are: Fission-Product Technology, Primary-Coolant Impurities, Structural Investigations, Safety Instrumentation and Control Systems, Accident Delineation, and Phenomena Modeling and Systems Analysis.

9940 **Water decontamination process improvement tests and considerations.** Collins, E.D.; Campbell, D.O.; King, L.J.; Knauer, J.B. (Oak Ridge National Laboratory, Oak Ridge, Tennessee). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **78**: No. 213, 9-15(1982).

Tests were made to improve the process for decontamination of the high-activity-level water at TMI-2. The objectives of these tests were: to increase the amount of cesium and strontium loaded on the zeolite sorbent, to reduce the cesium and strontium concentrations in the effluent water, and to remove the anionic contaminants from the water. Results indicated (1) that the cesium and strontium loadings could be increased by a factor of 5 by using mixed zeolites, (2) that the cesium and strontium concentrations in the zeolite effluent water could be reduced effectively by providing an aging period of several hours at about 75°C before a final contact with zeolite, and (3) that the anionic contaminants could be removed effectively by first deionizing the water by removal of sodium ions, using a hydrogen-form cation exchange resin, followed by sorption of the contaminants on an anion resin.

25 ENERGY STORAGE

2501 Magnetic

9941 **Superconducting magnetic energy storage.** Hassenzahl, W.V. (Lawrence Berkeley Laboratory, Univ. of California, Berkeley, CA). *Proceedings of the IEEE (Institute of Electrical and Electronics Engineers);* **71**: No. 9, 1089-1098(Sep 1982). Contract AC03-76SF00098.

Superconducting magnetic energy storage (SMES) is unique among the technologies proposed for diurnal energy storage for the electric utilities in that there is no conversion of the electrical energy, which is stored directly as a circulating current in a large superconducting magnet, into another energy form such as mechanical, thermal, or chemical. Thus one advantage of SMES is the inherent high storage efficiency that is possible because energy conversion processes are avoided. The actual round-trip efficiency of a large unit is expected to be 90 percent or greater. The fast response (< 100 ms) of the system to power demand means that a diurnal storage unit can also function as a swing generator or provide system stabilization. The major components of a SMES system are a large superconducting coil cooled by liquid helium, an ac-to-dc convertor, and a refrigerator that maintains the temperature of the helium coolant. This paper describes the design and functions of these and other components of an engineering reference design for a 1-GWh SMES unit. Also included is a sketch of the historical development of superconductivity, which was first discovered in 1911, and SMES, which was first proposed as a method of diurnal storage in 1969.

9942 **30-MJ superconducting magnetic energy storage system for electric utility transmission stabilization.** Rogers, J.D.; Hauer, J.F.; Miller, B.L.; Schermer, R.J. (Los Alamos National Laboratory, Los Alamos, NM). *Proceedings of the IEEE (Institute of Electrical and Electronics Engineers);* **71**: No. 9, 1099-1107(Sep 1982).

A superconducting magnetic energy storage (SMES) system has been built to damp power oscillations on the Western U.S. Power System, particularly on the Pacific AC Intertie that is used to transmit power from the Northwest to southern California. The 30-MJ superconducting inductor that stores energy for this purpose is contained in a nonconducting dewar and is supported by a helium refrigerator and a gas-handling system mounted on trailers. Energy flows in and out of the inductor at frequencies from 0.1 to 1.0 Hz with power amplitudes up to 11 MW. The principal oscillation to be damped has a characteristic frequency of 0.35 Hz. The superconducting coil maximum current is 5 kA with terminal voltages up to 2.2 kV. The coil interfaces with the Bonneville Power Administration 13.8-kV bus at the Tacoma Substation through a converter and transformers. The system can be operated with the converter either in parallel-bridge mode or for constant VAR control with the bridges in buck-boost mode. The program for the design, fabrication, installation, and the preliminary experimental operation of the system is reviewed.

2502 Compressed Gas

9943 **(PNL—4812) Thermophysical behavior of St. Peter sandstone: application to compressed air energy storage in an aquifer.** Erikson, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Dec 1983. Contract AC06-76RL01830. 64p. NTIS, PC A04/MF A01. Order Number DE84004759.

The long-term stability of a sandstone reservoir is of primary importance to the success of compressed air energy storage (CAES) in aquifers. The purpose of this study was to: develop experimental techniques for the operation of the CAES Porous Media Flow Loop (PMFL), an apparatus designed to study the stability of porous media in subsurface geologic environments, conduct experiments in the PMFL designed to determine the effects of temperature, stress, and humidity on the stability of candidate CAES reservoir materials, provide support for the CAES field demonstration project in Pittsfield, Illinois, by characterizing the thermophysical stability of Pittsfield reservoir sandstone under simulated field conditions.

9944 **Initial operation of the compressed air experiment at Pittsfield, Illinois.** Doherty, T.J.; Kannbery, L.D.; Marshall, R.P. (Pacific Northwest Laboratory). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1714-1720(Aug 1983). (CONF-830812—). Contract AC06-76RL01830.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The compressed air injection/withdrawal experiment at Pittsfield, Illinois began operation in October 1982. Its objectives are to determine the feasibility of aquifer storage of compressed air for utility storage, to explore the validity of existing numerical models and laboratory predictions, and to provide stability criteria for this technology. The Pittsfield experiment is a critical and necessary step in the commercialization of aquifer compressed air energy storage technology. The experimental facility was constructed and began operation under sponsorship of the U.S. Department of Energy. It is currently owned and operated by the Electric Power Research Institute. An extensive, relatively thin air bubble has been injected into the confined St. Peter sandstone 650 ft below ground surface. Measurements of pressure, temperature, mass flow rate, humidity, and water content define the physical character of the experiment. Cyclic injection/withdrawal tests with unheated and heated air at pressures up to 300 psi are underway to simulate full-size plant operation with and without thermal storage and recovery. Surface plant operation, air bubble geometry, data acquisition, pneumatic parameters and hydrologic behavior are discussed. Particular characteristics of the original test design and subsequent changes imposed by reservoir containment behavior are noted.

2505 Flywheels

9945 **(CONF-830430—3) Characterization of fiber composite flywheels by ultrasonic imaging techniques.** Tsao, M.C.; Grills, R.H.; Andrew, G.A.; Coppa, A.P. (General Dynamics Corp., Groton, CT (USA). Electric Boat Div.; General Electric Co., Philadelphia, PA (USA). Space Systems Div.). 1983. Contract W-7405-ENG-48. 11p. NTIS, PC A02/MF A01. Order Number DE84004689.

From 14. symposiumm on nondestructive evaluation; San Antonio, TX, USA (19 Apr 1983).

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A set of flywheels of different fiber composites has been investigated ultrasonically by an ULTRA IMAGE III System developed by General Dynamics. The 40 cm (16 in.) in diameter and 4.3 cm (1.7 in.) thick flywheels have been studied in an immersion test with a 2.5 cm (1 in.) diameter, 1.5 MHz, conically focused transducer. By monitoring the amplitude of the back surface signals from the wheels and displaying the amplitude variations with different color bands, the internal structures of the wheels such as the fiber orientations and bonding distributions can be examined in detail. The baseline information concerning the integrity of these prototype flywheels, relative to different manufacturing processes, with and without ring shrink fit, has been recorded. This paper describes a consistent, reliance, and cost-effective nondestructive test-

ing technique for analyzing the internal bonding structures of fiber composites.

9946 **(UCRL—15566) Composite ring-disk flywheel design, fabrication, and testing.** Coppa, A.P. (General Electric Co., Philadelphia, PA (USA). Space Systems Div.). Aug 1983. Contract W-7405-ENG-48. 244p. NTIS, PC A11/MF A01. Order Number DE84004761.

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A total of 19 rotors were fabricated, 14 of which were hybrid rotors having a nominal energy storage of 250 wh at maximum speed. The other five rotors produced were simple laminated disks intended for obtaining biaxial strength evaluation under spin conditions. The prototype hybrid rotors were designed in accordance with available material design data. Later the design was optimized by selecting a desirable ring/disk interference fit that reflected additional design data. These were inferred through study of previous hybrid rotor spin results. A simple laminated disk and a hybrid prototype successfully passed a 10,000 cycle endurance test. Rotors were also spin tested to destruction, demonstrating excellent ultimate energy densities. Ultrasonic tests were performed on a number of rotors. A design study of hybrid rotors employing graphite fiber/flexible urethane composite rings showed that energy densities approaching 40 wh/lb ultimate and 28 wh/lb, 10^5 cycle operational are possible. (LEW)

9947 **Peak reducing potential of flywheel storage.** Jarvinen, P.O.; Hart, G. (Massachusetts Institute of Technology, Lincoln Laboratory). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1796-1800(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The operation of a dedicated, on-site, magnetically suspended, utility-interactive, flywheel energy storage system in conjunction with a residential solar photovoltaic (PV) power system was simulated. The objective of the study was to determine the degree of peak utility demand reduction possible with energy storage. A magnetically suspended flywheel approach was selected because experimental tests of a 1 kWh unit of this type had demonstrated an 80 percent round trip electrical efficiency after storing the energy for ten hours. Realism was guaranteed in the digital simulation by using load data from monitored, lived-in residences in Concord, Mass; electrical output data from a full-size residential PV array at the Northeast Residential Experiment Station; and flywheel system efficiences measured on an actual 1 kWh flywheel unit. A continuous, 38-day period in May-June, 1981, was modeled using electrical load data and PV array data taken during this period. Initially, a 20 kWh flywheel storage capacity was selected for study. It was found that dramatic changes in load demand seen by the utility are possible when the house is equipped with flywheel storage; the maximum demand was reduced by a factor of five. The simulation also explored the relationship of storage capacity and peak demand. Capacities between 0 and 40 kWh were examined; flywheel capacities as low as 10 kWh were found to reduce the peak power demand seen by the utility to less than 30% of the original demand.

2506 Thermal

9948 **(BFR-T—42-1982) Extracting heat from and storing heat in ground and water. Method of inventory and statement of natural conditions.** Svensson, G.; Svedinger, B. (eds.) . (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1982. 79p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751410.

Portions are illegible in microfiche products.

Local environmental conditions must be given more attention in the regional and local energy planning. The extraction of heat from soil and water can be used in most of heating systems. The technical knowhow of today will motivate an increasing use of the heat sources in the soil and water. The technical development concerning the storage of heat has not got so far, whereas environmental conditions are well known and the localizing of the heat stores can be made in the municipal planning. The local politicians, energy technicists and planners, who have to originate and effect the inventories of the local conditions for natural thermal systems may profit from this paper.

9949 **(BFR-T—44-1982) Extracting heat from and storing heat in ground and water. Legal aspects.** Brink, R.; Tullberg, H. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1982. 70p. (In Swedish). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751409.

Land and water as a source of heat and energy will be utilized increasingly. The technique is now launched for both single dwelling houses and for large central heating systems. The legislation is not directly adjusted to the new energy technique, and advices and instructions must be taken from the rules for the use of water, for the protection of the environment and from the building by-laws. In this paper the present Swedish statutes and committee work in lawmaking will be examined concerning the application to the heat from ground surface, sea, subsoil water and to the storing of heat in deeper formations of land and rocks. The authors are doubtful about the introduction of particular rules for energy legislation and point out the need of information of present codes of the law, regulations and rules for idemnity and damages.

9950 **Aquifer seasonal energy storage: results and simulations of moderate temperature field experiments.** Molz, F.J.; Guven, O.; Melville, J.G.; Tsang, C.F. (Auburn University). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1721-1727(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Results of the most recent set of field experiments (3rd set) performed by Auburn University and computer simulations performed by the Lawrence Berkeley Laboratory are reported. The experiments consisted of 3 injection storage-recovery cycles of 3 months, 7.3 months and 8 months duration respectively. These are labeled 3-1, 3-2 and 3-3 respectively. Cycles 3-1 and 3-2 were analyzed prior to completion using a computer model called PT. These true predictions compared reasonably well with experimental data. Both experimental and theoretical results support the conclusion that layering and buoyancy flow are important factors in evaluating the feasibility of an aquifer thermal energy storage system. At the Mobile site during experiment set 3 it appears that both phenomena interacted synergistically to lower the energy recovery. This is significant because layering is usually not obtained through a conventional well test.

9951 **Performance of a cylindrical phase-change thermal energy storage unit.** Jacobson, D.L. (Arizona State Univ., Tempe); Ponnappan, R. *AIAA (American Institute of Aeronautics and Astronautics) Journal;* **21**: 774-780(May 1983).

9952 **Comparison of domestic olivine and European magnesite for electrically charged thermal energy storage.** Laster, W.R.; Gay, B.M.; Palmour, H.; Schoenhals, R.J. (Ray W. Herrick Laboratories, School of Mechanical Eng., Purdue Univ, West Lafayette, IN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 717-728(1982). Contract W-7405-ENG-26.

Electrically charged thermal energy storage (TES) heaters employing high heat capacity ceramic refractories for sensible heat storage have been in use in Europe for several years. With these devices, low cost off-peak electrical energy is stored by heating a storage core composed of ceramic material to approximately 800°C. During the peak period, no electrical energy is used as the building heating needs are supplied by extracting the stored energy from the core by forced air circulation. The recent increase in use of off-peak TES units in the U.S. has led to the search for a domestic supply of high heat capacity ceramic refractory material. North Carolina's extensive but underutilized supply of refractory grade olivine has been proposed as a source of storage material for these units. In this paper the suitability of North Carolina olivine for heat storage applications is assessed by comparing its thermal performance with that of European materials. Using the method of ASHRAE Standard 94.2, the thermal performance of two commercially available room-size TES units was determined experimentally with two different storage materials, North Carolina olivine and German magnesite. Comparisons are made and conclusions are drawn.

9953 **An evaluation of ASHRAE Standard 94.2 for testing electrically charged thermal energy storage room-size units.** Kuehlert, M.F.; Anderson, S.H.; Hersh, H.; Laster, W.R.; Schoenhals, R.J.; Stevens, L.W. (Ray W. Herrick Laboratories, School of Mech. Eng., Purdue Univ., West Lafayette, IN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 696-716(1982). Contract W-7405-ENG-26.

This paper describes research associated with performance evaluation of electrically charged thermal energy storage room-size units in accordance with ASHRAE Standard 94.2. A calorimeter chamber was designed, fabricated, instrumented and calibrated. Eight different room-size units, with charging rates ranging from 2 to 6 kW, were tested under various conditions. In addition to the measurements specified by the Standard, other measurements were obtained and analyzed in order to diagnose the behavior of the calorimeter and the units during testing. In general, good quality was achieved as evidenced by the fact that the calculated thermal output of a particular unit, based on test measurements, typically differed from the measured electrical input by no more than 2 percent at the conclusion of the test.

9954 **An evaluation of ASHRAE standard 94.2 for testing electrically charged thermal energy storage central units.** Elter, M.R.; Lin, C.P.; Schoenhals, R.J. *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 679-695(1982). Contract W-7405-ENG-26.

This paper describes research associated with performance evaluation of electrically charged thermal energy storage (TES) central units in accordance with ASHRAE Standard 94.2. A 30 kW central unit was used for conducting the experimental work. Two different arrangements were studied in regard to placement of the nozzle associated with the airflow rate measurement, and only one of those yielded valid test results. It was found that the presence of the nozzle decreased the flow rate by approximately 30%. Variation of the inlet air temperature level produced sizable changes in both the thermal discharge rate and the duration of the discharge period, but caused only small changes in the reported thermal performance of the TES device. The neglect of humidity level of the inlet air was found to result in errors no larger than 0.5%. Test results obtained with domestic olivine energy storage bricks were compared with corresponding test results obtained with English olivine bricks. The results indicate that the thermal performance of the TES unit was approximately the same for the two types of bricks.

2509 Batteries

REFER ALSO TO CITATION(S) 10191, 10372, 10373, 10374

9955 **(LBL—16716) Solid electrolyte degradation: problems and solutions.** DeJonghe, L.C. (Lawrence Berkeley Lab., CA (USA)). Sep 1983. Contract AC03-76SF00098. 10p. (CONF-8310241—1). NTIS, PC A02/MF A01. Order Number DE84002916.

From DOE/EPRI beta battery workshop; Washington, DC, USA (18 Oct 1983).

In this paper our present understanding of degradation phenomena in sodium beta aluminas is reviewed. The theories and experimental results permit the formulation of suggestions for further electrolyte and cell development that could lead to improved battery performance. The indications are that conditions exist where degradation of the electrolyte itself may be avoided.

9956 **Development of alkaline zinc/ferricyanide battery.** Hollandsworth, R.P.; Adams, G.B.; Webber. (Lockheed Palo Alto Research Laboratory). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1574-1581(Aug 1983). (CONF-830812—). Contract AC04-76DP00789.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The zinc/ferro-ferricyanide battery system is intended for utility load leveling and solar photovoltaic/wind applications with advantages of high cyclic efficiency, high cell voltage, random cycling without zinc strip cycles and with switching times of less than 5 ms from load to insolation or vice versa. Self-discharge has been measured at 1.6%/day. The system demonstrates excellent electrochemical performance. Cell voltages are 1.88 V OCV and 1.61 V discharge at 35 mA/cm² or 57 mW/cm² in 2N NaOH at 40°C (Nafion N-125 separator). Cell polarization losses are almost entirely resistive and within the separator. Over 800 4-hr cycles have been demonstrated in cell of 60-cm² nominal area (70 mA.h/cm² capacity) with mean energy efficiency of 76.6 + or - 2.1 percent). Similarly, a 60-cm² cell has demonstrated over 220, 11 to 17 hour cycles (255 + or - 48 mA.h/cm² capacity) with a mean energy efficiency of 75.3 + or - 5.1 percent.

9957 **Current status of the development of the refuelable aluminum-air battery.** Cooper, J.F.; Kraftick, K.K.; McKinley, B.J. (Lawrence Livermore National Laboratory). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1628-1634(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This report reviews the technical status of a refuelable aluminum-air battery using flowing caustic-aluminate electrolyte at 50-70°C. Four distinct designs for rapidly-refuelable cells were evaluated in single or multicell modules on an engineering scale (167-1000 cm²/cell). Consideration is given to cells of the wedge configuration, which allow partial recharge, high anode utilization, and rapid refueling. Kinetic models developed for aluminum trihydroxide precipitation are used to predict the behavior of integrated cell/crystallizer systems. Drive-cycle life and polarization data are reviewed for air-electrodes under simulated vehicle operating conditions. Problems in the development of cost-effective anode alloys are described. These results are interpreted from the perspective of the potential of an aluminum-air battery to provide an electric vehicle with the range, acceleration and rapid-refueling capabilities of common automobiles.

9958 **Storage battery aspects of air-electrode research.** Buzzelli, E.S.; Berk, L.B.; Demczyk, B.G.; Zuckerbord, D. (Westinghouse Research and Development Center). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1703-1707(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The use of air electrodes in secondary, alkaline energy storage systems offers several significant advantages over other conventional cathode systems. The oxygen, required for operation, is not stored or carried within the battery system. The weight of the air electrode is significantly lower than alternative cathode couples for the same mission. The cost of the air electrode is potentially low. As a result of these characteristics, alkaline electrolyte energy storage systems with air electrodes have the potential for achieving energy density levels in excess of 150 Whr/kg at low costs, $30-$40/kWh. The primary key to a successful metal-air secondary battery for an EV application is the development of a bifunctional air electrode. This paper discusses the various aspects of air electrode research for this application, as well as the physical and performance requirements of the air electrode in this advanced technology battery system.

9959 **Testing and evaluation of advanced lead-acid batteries for utility load-leveling applications.** Miller, J.F.; Corp, D.O.; Hayes, E.R.; Hornstra, F.; Yao, N.P. (Chemical Technology Division, Argonne National Laboratory, Argonne, IL). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1595-1598(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Testing and evaluation of advanced lead-acid batteries developed by Exide for utility load-leveling applications have been conducted at Argonne National Laboratory's National Battery Test Laboratory since April 1982. These batteries (36-kWh and 18-kWh modules) have a projected life of greater than 4000 deep discharge cycles. This paper describes results obtained to date from the test program. Parametric test results and general performance observations for these batteries are reported.

9960 **Performance of a rapidly-refuelable aluminum-air battery.** Levy, D.J.; Gonzales, E.M.; Hollandsworth, R.P.; Littauer, E.L. (Lockheed Palo Alto Research Laboratory, Palo Alto, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1635-1640(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The Al-air battery is being developed to provide an electric vehicle with conventional automobile performance. A rapidly-refuelable, 6-cell battery (200-cm^2 electrodes) was evaluated. RX-808 aluminum anodes and air cathodes were used with a flowing alkaline electrolyte. Peak power was found to increase with temperature, decrease with aluminate concentration and be unaffected by electrolyte flow. The best performance was 5.28 kW/m^2 peak power density, 2.08 kWh/kg Al energy density and 80% coulombic efficiency. Anode refueling is rapid and 100% utilization is achieved. Additional evaluation included cathode catalysts, a thermal balance and monitoring electrolyte composition.

9961 **Zinc/bromine prototype batteries evaluation.** Butler, P.C.; Miller, D.W. (Sandia National Laboratories). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1653-1657(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Prototype flowing electrolyte batteries are being tested at Sandia National Laboratories. Zinc/bromine batteries from Exxon Research and Engineering Company and from Energy Research Corporation are being evaluated. Results of tests on four Exxon units and one ERC unit are discussed. These results include battery cycle histories, electrochemical efficiencies, parametric test data, and failure analysis results.

9962 **The battery energy storage test (BEST) facility - first year of operation.** Pivec, A.; Hyman, E.A.; Mitchell, T.A.; Radimer, B.M. (Public Service Electric and Gas Co., Newark, New Jersey). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1658-1664(Aug 1983). (CONF-830812—). Contract AC02-76ET29368.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Operation of the baseline BEST Facility in 1982 provides the first useful information about the characteristics of a utility-operated battery energy storage system. The baseline BEST Facility includes a 1.8-MWh lead-acid battery, 2.5-MW converter and process control computer operating in a 13.8-kV interconnection with PSE & G's transmission and distribution grid. Test operations described include repetitive cycling in eight different modes representative of typical utility and customer-side applications. Electrical and thermal performance characteristics and operating and maintenance experience are reported.

9963 **Charge characteristics of Ni/Fe traction cells.** DeLuca, W.H.; Biwer, R.L.; Tummillo, A.F.; Yao, N.P. (Argonne National Laboratory, Argonne, Illinois). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1680-1684(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The specific energy and cycle life of nickel/iron (Ni/Fe) battery systems exceed those of lead-acid systems. However, in order for the Ni/Fe system to achieve full capacity, a significant overcharge must be applied. As a result, electrolyte consumption and gassing levels are increased, and cycling efficiencies (Ah and Wh) are reduced. In a series of tests performed on 6V Ni/Fe modules, a range of recharge levels and charge rates were examined for three charge methods. The results show that higher discharge capacities are achieved at higher recharge Ah levels, but at lower Ah and Wh cycling efficiencies. However, when the modules are continuously cycled at any recharge level, repeatable module performance is obtained. Consequently, the optimum combination of module discharge capacity and cycle efficiency can be obtained for any given application by proper selection of the recharge level. It was also observed that at a fixed recharge level, module charge acceptance is virtually independent of the charge method. The tested modules also exhibited a self-discharge loss in capacity that was directly related to the length of the open-circuit stand time after charging and module state-of-charge. This paper describes the test procedures used, presents the test data, and discusses the results obtained.

9964 **Status of the Ford Aerospace sodium-sulfur battery program.** Gates, A.B. (Ford Aerospace & Communications Corporation, Aeronutronic Division, Newport Beach, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1690-1695(Aug 1983). (CONF-830812—). Contract AM02-79CH10012.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Sodium-sulfur batteries are being developed by Ford Aerospace & Communications Corporation to meet the needs of electric utilities and for electric vehicle applications. Current emphasis for utility applications is on durability testing of load-leveling cells in modules of a 100-kWh battery. Electric vehicle cells characterized by high energy and power densities have been developed, and are being tested in modules of an electric vehicle battery.

9965 **Zinc-bromine batteries for bulk energy storage.** Bellows, R.J.; Einstein, H.; Elspass, C.; Grimes, P.; Katner, E.; Malachesky, P.; Newby, K. (Exxon Research and Engineering Company, Linden, NJ). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1696-1702(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The development of a utility bulk energy market has been severely limited by the lack of better energy storage batteries. Lead acid batteries presently dominate the market. However, lead acid batteries suffer various limitations in the area of cost, maintenance, etc. Design projections for zinc-bromine batteries are attractive for bulk energy storage (BES) and electric vehicle (EV) applications in terms of low manufacturing costs and good performance characteristics. Zinc-bromine battery projections compare favorably with both current lead acid batteries and other advanced battery candidates. In recent years, Exxon's zinc-bromine battery program has shown rapid progress in terms of solving system problems and demonstrating both rapid scale-up of the system and competitively low cost manufacturing techniques.

9966 **Statistical analysis of lithium iron sulfide status cell cycle life and failure mode.** Gay, E.C.; Battles, J.E.; Miller, W.E. (Argonne National Laboratory, Chem. Tech. Div., Argonne, IL). *Journal of the Electrochemical Society;* 130: No. 8, 1646-1650(Aug 1980).

Groups of 12 or more identical Li-alloy/FeS cells fabricated by Eagle-Picher Industries, Incorporated and Gould Incorporated were operated at Argonne National Laboratory in the status cell test program to obtain data for statistical analysis of cell cycle life and failure modes. The cells were full-size electric vehicle battery cells (150-350 A-hr capacity) and were cycled at the 4 hr discharge rate and 8 hr charge rate. The end of life was defined as a 20% loss of capacity or a decrease in the coulombic efficiency to less than 95%. Seventy-four cells (6 groups of identical cells) were cycle life tested, and the results were analyzed statistically. The ultimate goal of this analysis was to predict cell and battery reliability. Testing of groups of identical cells also provided a means of identifying common failure modes which were eliminated by cell design changes. Mean time to failure for the cells based on the Weibull distribution is presented. Post-test examinations determined the causes of failure in each cell group, and corrective actions are discussed.

29 ENERGY PLANNING AND POLICY

9967 **(DOE/IG—0008/5) Office of Inspector General FY 1983 semiannual report, April 1, 1983-September 30, 1983.** Richards, J.R. (USDOE Office of Inspector General, Washington, DC). 30 Nov 1983. 49p. TIC, PO Bx 62, Oak Ridge, TN 37831.

The Office of Audits issued four public reports and 109 other reports which primarily resulted from our reviews of depart-

mental contracts. From IG recommendations, DOE has made commitments to more effectively use over $8 million. An additional $4.8 million of contractor costs were recovered during the six months ending September 30, 1983 as a result of the audits. The Office of Inspections issued reports on seven major departmental activities including: the oil drawdown reliability at a Strategic Petroleum Reserve; a classified report on the safeguards, security, and safety systems for special nuclear materials; and quality assurance of a project to convert corn to ethanol. During this reporting period, 56 Office of Investigations cases were referred to prosecutive authorities and other investigative agencies. Twenty-six of the cases were accepted for prosecution. Monies identified for recovery as a result of investigative cases totaled $183,854 and three IG cases resulted in recommendations that suspension and debarment actions be initiated against three firms. (PSB)

9968 **(IAEA-R—2491-F) Nuclear risk assessment and public acceptance. Final report for the period 1 December 1979-30 November 1982.** Savellano, R.A. (International Atomic Energy Agency, Vienna (Austria)). Jan 1983. 121p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704127.

The report describes the methodology and the results of a study of public attitudes towards five energy sources: nuclear power, hydro power, solar energy, oil and geothermal energy. The analysis is based on a survey carried out in the Metro Manila area in the Philippines. The samples consist of Barangay Leaders (192 respondents), Science teachers (170 respondents), and university students (174 respondents). The survey utilized a questionnaire which is based on a psychometric model and allows for internal cross-checking of independent attitude measures. The analysis shows that for all subgroups nuclear power is the least preferred option. Those opposing nuclear power also have negative attitudes towards oil and are less favourable towards the other energy systems also. It was found that the subjects strongly related nuclear power to environmental risks (which they did not for solar, hydro, geothermal) and were not convinced about its economic benefits. They rated the technological benefits of all the five energy systems equally high and believed in sociopolitical implications of all energy systems except solar energy. Women are strongly less favourable towards nuclear power and oil than men. They are also more afraid of its risks and less convinced about its benefits. The influence of other variables like age, education and information source is rather low. The report also compares public attitudes towards nuclear power and geothermal energy in the vicinity of a geothermal site in Dumaguete City in Negros Oriental.

9969 **(IAEA-R—2612-F) Perceived risk of nuclear and hydro electrical power generation in Colombia. Final report for the period 1 July 1980-31 January 1983.** Munera, H.A. (International Atomic Energy Agency, Vienna (Austria)). Dec 1982. 226p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704128.

This report deals with the estimation of risk factors of hydro plants and the perception of risks and benefits of nuclear, hydropower and coal by a selected part of the public. Historical data (1922 - 1979) on occurrence of earthquakes in Colombia demonstrate high seismicity (3,489 incidents) for the country in total and also for areas where the majority of hydro projects are to be located. Model-based calculations of regional probabilities for earthquakes at prospective dam-sites with a magnitude of 7 (Richter scale) or larger resulted in p=0.038/year for a 50 year recurrence period for high and p=0.0004/year for low seismicity areas. Attitudes towards three energy systems were elicited from 130 university students and graduates with a questionnaire based on a psychometric model. Generally attitudes were most favourable towards hydro, less favourable towards coal and more critical towards nuclear. Nuclear is perceived to have economic advantages, but to pose environmental, individual and societal risks. Respondents PRO and CON nuclear agree on the lack of risk from hydropower.

2901 Energy Analysis And Modeling

REFER ALSO TO CITATION(S) 9320, 9334, 9335, 9338, 9369, 10017, 10029, 10114

9970 **(NP—4770121) Energy problems of the developing countries.** Polte, W. (Kreditanstalt fuer Wiederaufbau, Frankfurt am Main (Germany, F.R.)). 1983. 69p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84770121.

Starting from the recent energy consumption and the assumed development of the energy demand in the future the effects of the oil price increases and the firewood crisis on the developing countries are described in the first place and various solutions are demonstrated. At the same time the author tries to provide a certain stock report of the recent experiences of the credit bank with energy plans in developing countries and to present some ways of future financial cooperation on the energy sector. Numerous relevant data are given in the appendix.

9971 **(NUREG/CR—3553) Efficient simulation approach for evaluating the potential effects of nuclear power plant shutdowns on electrical utility generating systems.** Van-Kuiken, J.C. (Argonne National Lab., IL (USA)). Jun 1983. Contract W-31-109-ENG-38. 43p. (ANL/EES-TM—233). NTIS, PC A03/MF A01 - GPO. Order Number DE84005324.

A simulation approach is described which facilitates the evaluation of potential nuclear power plant shutdowns. The simulation focuses on three major areas of possible impacts to electrical generating systems and pools of systems: costs of replacement power, patterns of fuel consumption, and system reliability. Two primary objectives in this effort have been to reduce (1) computational costs, which become substantial for evaluations of large electrical systems, long time frames, and comprehensive investigations of shutdown alternatives and sensitivities; and (2) the time required to complete case-study evaluations. This report describes the methods used to accomplish these objectives and demonstrates the use of these methods through several illustrative case studies.

9972 **(PB—83-252866) Reestimation of the EDM in the Netherlands and the reference case. Final report.** (Commission of the European Communities, Luxembourg). [nd]. 86p. (EUR—8361-EN). NTIS, PC E05/MF E05.

Results from work on the Netherlands medium-term energy model programme (EURECA-EXPLOR-EDM) are reported in Part I. The Netherlands energy demand model (EDM) is reestimated using data from the Economic Institute of Tilburg. The coefficients of the Netherlands EDM model are discussed and the refernece case study applied to the Netherlands is presented using the re-estimated model. In the second part, the revised model is analysed by the Economic Institute of Tilburg, and the results of the estimations are compared with those of the Dutch Central Planning Bureau (CPB). Divergent results per sector are attributed to the incorporation of an energy policy into the CPB model and to differences in industrial and other macro-economic growth developments. (Copyright (c) ECSC-EEG-EAEC 1982.)

9973 **Global energy production and use to the year 2050.** Edmonds, J.; Reilly, J. (Institute for Energy Analysis (IEA), Oak Ridge Associated Universities, Washington, DC). *Energy (Oxford);* **8**: No. 6, 419-432(Jun 1983). Contract AC05-76OR00033.

The authors have explored the long-term global evolution of energy production and consumption, in conjunction with a program to investigate the global carbon dioxide issue. This paper presents energy findings which have grown out of that work. While the initial motivation to look at energy was environmental, that look has revealed many energy surprises such as a stable world oil price to the year 2000, which delays the introduction of backstop technologies until the next century, a major shift toward shale oil and coal to produce liquid fuels after 2025, and a heavy substitution of conservation and small-scale solar energy for commercial fuels, but only a minor penetration of centralized solar electric power generation. The base case is a conditional projection. The authors also

consider some of the major factors which could result in alternative evolutionary paths of the global energy system.

9974 **Thermal load and computer simulation run-time comparisons using a research version of DOE-2.** Sullivan, R.; Cumali, Z.O.; Nozaki, S. (CCB/Cumali Associates, Oakland, CA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 278-290(1982). Contract AC03-80SF10840.

One of the most important items to be addressed - and heretofore generally ignored when comparing results from various thermal load algorithmic schemes - is the contribution to observed differences arising from the varying input quantity calculations. Such a situation was dealt with in previous work. In that instance, a stand-alone program was written using implicit input parameters that were used in applying either weighting factor or thermal balance solution procedures. The reason for creating such a program was to study the effect of the definition of custom weighting factors using a recursion technique developed earlier. The ability to generate such space-specific weighting factors necessarily implied better agreement between weighting factors and thermal balance calculated results. And, in fact, that is exactly what occurred. As a result, the custom weighting factor methodology was included in subsequent versions of the DOE-2 simulation program.

2902 Economics And Sociology

REFER ALSO TO CITATION(S) 9337, 9342, 9383, 9545, 9551, 9718, 10045

9975 **(CONF-8010351—) Energy policy in business.** (Energieforum Schweiz, Bern (Switzerland)). Feb 1981. 122p. (In German and French). (CONF-8010352—; CONF-8011199—; CONF-8011200—). NTIS (US Sales Only), PC A06/MF/A01. Order Number DE84770123.

From Seminar on energy policy in business; Zurich, Switzerland (24 Oct 1980).

9976 **(CONF-8310239—1) Energy related innovation: the missing link. A revision and integration of the business cycle theories of Keynes and Schumpeter.** Santini, D.J. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 127p. NTIS, PC A07/MF A01. Order Number DE84003614.

From 16. international Atlantic economic conference; Philadelphia, PA, USA (6 Oct 1983).

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A theory is developed asserting that energy-induced first-cost-increasing waves of partially successful vehicle innovations cause depressions, while immediately successful cost-reducing innovations cause recessions. In a recession, cost-reducing innovations cause recessions. In a recession, cost-reducing innovations briefly drive down sales of vehicles using old technology. The reductions in cost, however, create opportunities for profit, while the success of the innovation allows other producers to copy it. Since consumer acceptance is high, sales increase and a boom follows. Depression innovations are characterized by a long sequence of partially successful first-cost increasing and operations cost decreasing vehicle innovations. Vehicle costs increase initially because of the investment needs for innovation. Uncertainty causes consumers to delay vehicle purchases. Defining sales cause increasing investment costs to be spread over fewer consumers, thus driving costs up further. The theory is contrasted with those of Keynes, Schumpeter, Kondratiev, and, of more recent vintage, Mensch and Freeman. The theory is tested quantitatively for the US during the 1783 to 1900 period, a period during which four long depressions occurred. Test results are highly consistent with the theory proposed.

9977 **(DOE/CH/10122—19) Midwest Appropriate Technology Small Grants Program project summaries.** (ESG, Inc., Atlanta, GA (USA)). Oct 1983. Contract AC02-82CH10122. 178p. NTIS, PC A09/MF A01. Order Number DE84004466.

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This document contains Project Summaries and Assessment Memorandums on 84 projects funded under the Midwest ATSGP conducted in Federal Region V. This region encompasses the states of Illinois, Indiana, Ohio, Michigan, Minnesota, and Wisconsin. The projects were reviewed, assessed, and summarized by Energy Systems Group, Inc. under contract to the DOE Chicago Operations Office. The information in this document is organized alphabetically by state, and alphabetically by grantee within each state grouping. More information on these and other ATSGP projects can be acquired through the National Center for Appropriate Technology, P.O. Box 3838, Butte, MT 59702 or through the National Technical Information Service, US Department of Commerce, 5285 Port Royal Road, Springfield, VA 22161.

9978 **(DOE/EI/08544—T1) Estimating household energy expenditures in the Phase I Comprehensive Human Resources Data System. Task 11 final report.** King, J.A. (Mathematica Policy Research, Inc., Washington, DC (USA)). Jan 1978. Contract AC01-77EI08544. 56p. NTIS, PC A04/MF A01. Order Number DE84004942.

Revised electricity and piped gas expenditures imputed to households on the 1974 CHRDS file with equations estimated from the WCMS 1975 Household Energy Survey are presented as superior to the original CHRDS expenditures. The adjustment factors necessary to calibrate the expenditures with state-by-state control data were generally smaller than those previously required, and, more importantly, the variations in expenditures by different characteristics, including income, age of head, race of head, family size, and tenure were much more reasonable than the original expenditures when assessed against the 1972-73 Consumer Expenditure Survey data. Without an absolute standard of the true energy expenditures of the US population by which to assess the CHRDS file, however, it is impossible to conclude that the CHRDS revised electricity and piped gas expenditures reflect accurately the energy expenditures of different subgroups of the population.

9979 **(DOE/EI/08544—T2) Extending the CHRD System into a microanalytic model of the US economy: a literature review and preliminary design.** Hollenbeck, K.; Raines, F. (Mathematica Policy Research, Inc., Washington, DC (USA)). 12 Dec 1977. Contract AC01-77EI08544. 33p. NTIS, PC A03/MF A01. Order Number DE84004113.

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This review places the Phase I Comprehensive Human Resources Data System (CHRDS) in the context of models of the aggregate economy and suggests extensions to CHRDS which would provide it with the capability of analyzing the full impacts of an energy policy as it works its way through the entire economy. CHRDS is a very sizable household data system which includes a model of the energy expenditure responses of consumers to changes in energy prices or household disposable income. A change in the price of energy, however, can also result in higher prices for other nonenergy goods. Hence, energy policies can have indirect effects on households' consumption patterns. Moreover, energy prices can affect the demand for factors of production. In particular, energy price increases can affect labor markets and hence affect wage and salary income. These effects will again influence consumption patterns and consumer well-being. Because the CHRDS data are extremely disaggregated, a microanalytic approach seems to be the most promising way to extend CHRDS to capture these indirect effects.

9980 **(DOE/EI/08544—T3) Household impacts of gasoline decontrol.** Beebout, H.; King, J. (Mathematica Policy Research, Inc., Washington, DC (USA); Hendrickson Corp., Washington, DC (USA)). 31 Aug 1977. Contract AC01-77EI08544. 72p. NTIS, PC A04/MF A01. Order Number DE84004943.

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The Phase I CHRD System was used to estimate the direct impact on household gasoline expenditures of the gasoline price decontrol proposal. Decontrol was evaluated under two assumptions, a uniform 3 cents per gallon price increase at the pump in 1979 and a higher, 10 cents per gallon increase in 1979. Decontrol is estimated to increase average gasoline expenditures for households owning one or more cars from $724 under the current regulation (BAU) scenario for 1979 to $789 under the 10 cents decontrol scenario. This increase amounts to a change of 0.5 in the percent of disposable income spent on gasoline. These impacts are examined for a

variety of population subgroups in the body of this report and the estimated impact varies substantially. In absolute dollar terms, the impact is obviously greatest on those who drive a lot, with workers commuting more than 15,000 miles annually estimated to spent $114 more on gasoline under the 10 cents decontrol scenario. Higher income families drive more on average than low income families, and, hence, have larger dollar increases from decontrol, but the impact as measured by the percent of disposable income spent on gasoline is higher for lower income families where an additional 0.8 of a percent of their disposable income is devoted to gasoline, compared to an additional 0.3 of a percent for families with incomes over $20,000.

9981 (NP—4770106) **Supply response of resource extracting firms to pre-announced price changes.** Ngo Van Long; Sinn, H.W. (Mannheim Univ. (Germany, F.R.). Fakultaet fuer Volkswirtschaftslehre und Statistik). 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84770106.

Conventional static micro-economic production theory predicts that the supply of a product will increase (or at worst remain unchanged) if its price rises. This is also true for the extraction rate (at time t) of an exhaustible resource, if the price (at time t only) rises. It is possible that during some time interval [tsub(a),tsub(b)] - a proper subset of the time interval [o,tsub(s)] - the extraction rate if the extraction cost is stock-dependent. Similarly while it is true that accumulated extraction (from time tsub(s)) is higher in response to the pre-announced upward price shift, is not true that the extraction rate is higher for all t > = tsub(s) as compared with the reference (no-price-shift) case. Section 2 contains the basic results. In Section 3 it is shown that an upward price jump is compatible with the possibility of storage, provided that there are positive set-up costs associated with storage.

9982 (NP—4770107) **Cost prices and partially fixed factor proportions in energy substitution.** Conrad, K. (Bonn Univ. (Germany, F.R.). Inst. fuer Gesellschafts- und wirtschaftswissenschaften). Jun 1980. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84770107.

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The objective of this paper is to propose an approach in production economics which incroporates the aspect of substitutability in the neoclassical theory as well as the aspect of partially fixed factor proportions in the Walras-Leontief approach. The crucial idea is to decompose the input quantity in a component bound by the use of other inputs and in a component unbound or free for substitution. From the cost side this partitioning implies that the effective price of a factor consists of the own price as well as of weighted prices of the other inputs with weights indicating which inputs are bound in which order of magnitude to the use of a unit of the corresponding factor of production.

9983 (NP—4770113) **Effects of investments on energy consumption in industry.** Reinhard, M.; Thanner, B.; Scholz, L. (Ifo-Institut fuer Wirtschaftsforschung, Muenchen (Germany, F.R.). Projektgruppe Energie, Rohstoffe, Technologie). 1983. 302p. (In German). NTIS (US Sales Only), PC A14/MF A01. Order Number DE84770113.

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An approach is developed which permits an optimally broad and intertemporal comparison of the motives of investment in industry from the Seventies until the present. Thus the energy costs are to be registered in their overall context as a determining factor of the investment behaviour. The Ifo Institute is able to carry out these analyses as it is provided with inquiry instruments by the help of which the investment motives of the industrial firms had been partly registered and have still been registered for special problems. The strong price increases for various energy carriers since 1973 and from today's point of view, the probable continuation of this trend at least in the long term make it necessary to tendentially decouple energy consumption from economic growth. It may be of considerable importance for the competitive ability of the German industry in the Eighties to what extent and at what speed the changed energy-economic framework conditions can be accounted for by product and process innovations. Investments supported by product and process innovations are the most important instrument in the medium and long term which helps to establish the corresponding procedures of adaptation.

2903 Environment, Health, And Safety

REFER ALSO TO CITATION(S) 9286, 9288, 9321, 9343, 10027, 10031, 10146, 10659, 10680, 10696, 10697, 10698, 10699, 10700, 10701, 10723, 10736, 10841, 10842, 10949

9984 (CONF-821215—, pp 195-199) **Influence of PCB and hazardous waste regulations on the operations of the Western Area Power Administration.** Mathias, K.E.; Kirby, J.J. (Western Area Power Administration, Golden, CO). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Economic impacts from the disposal of PCB wastes and the replacement of equipment are described. A western-wide 10-year PCB capacitor replacement program was developed at an estimated cost of 6.75 million dollars. A western-wide PCB oil treatment contract is being considered to reclassify equipment in which approximately 300,000 gallons of 10 to 4200 ppM PCB oil is contained. A western-wide contract, rather than by current individual procurements, is planned for a more economic bulk transportation and disposal of PCB Items which cannot be handled by other treatment methods. Administrative adjustments to direct compliance such as directives, guidelines, and direct problem assistance, are carried out at the Headquarters Division of Environmental Affairs. Audit inspections under DOE and Western Order 5482.1 are directed from the office. A Western Hazardous Waste Management Committee, consisting of Headquarters and area personnel has been formed to provide a coordination, information, and problem solving forum for local and Western-wide PCB and hazardous waste problems. (JMT)

9985 (CONF-821215—, pp 201-209) **Coal conversion: the CH experience.** Alspaugh, V.L. (Dept. of Energy, Argonne, IL). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

In FY 1980, reflecting concerns of economy and national energy policy, the Chicago Operations Office reconverted Argonne Boiler No. 5 from gas/oil to coal firing. Efforts to promote this conversion required extensive legal and technical coordination, and consisted of (1) designing and performing modifications to the physical plant; and (2) securing state construction and operating permits. To satisfy the requirements of the National Environmental Policy Act of 1969, an Environmental Assessment was conducted, which resulted in a Finding of No Significant Impact (FONSI). Environmental and cultural evaluations also were performed under the National Historic Preservation Act of 1955; Executive Order 11593, Protection and Enhancement of the Cultural Environment; and Executive Order 11988, Floodplains Management. However, the major obstacle to operation of the converted plant was provisions of the Clean Air Act. 2 tables.

9986 (CONF-8310237—1) **CO_2 emission tax policy: a sensitivity analysis.** Daly, T.A.; Kosobud, R.F. (Argonne National Lab., IL (USA); Illinois Univ., Chicago (USA)). Oct 1983. Contract W-31-109-ENG-38. 24p. NTIS, PC A02/MF A01. Order Number DE84003714.

From 13. annual Illinois Economics Association; Chicago, IL, USA (28 Oct 1983).

This study applies an economic research methodology to the problems caused by a particular pollutant, CO_2; estimates an optimal tax rate on CO_2 that limits the accumulation of that pollutant to acceptable levels; determines the impact of this abatement policy on the choice of energy technologies and the long run growth paths of the welfare indicator (consumption), GNP, energy resource use, and product and factor prices; and reveals the sensitivity of optimal emission taxes to changes in key determining factors. This study suggests that the optimal tax rate on CO_2 emissions is low for decades and then builds up significantly as the concentrations of CO_2 buildup to the threshold level. However if capital and labor are allowed to substitute more easily for energy, then the tax rate remains low for another twenty-five years and by the year

2040 is only 6 percent of the rate in the run with a lower elasticity of substitution.

9987 **(CONF-8310238—2) Anaerobic technology - hazardous wastes.** (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 9p. NTIS, PC A02/MF A01. Order Number DE84003635.

From Illinois hazardous waste task force joint meeting of the committee on alternate technologies and economics committee; Rockford, IL, USA (25 Oct 1983).

Technology assessment as well as economics of anaerobic processing of sludges are reviewed with the potential for methane production. Research and development projects in Illinois are tested. (PSB)

9988 **(DOE/NBM—4004902) Great Plains Gasification Associates Facility, North Dakota: recommendations for a supplemental environmental program. Final report of the Ecological and Environmental Effects Subcommittee.** Wobber, F.J. (USDOE Office of Energy Research, Washington, DC). Mar 1983. 43p. NTIS, PC A03/MF A01. Order Number DE84004902.

As defined in the Loan Guarantee Agreement (LGA) between the Federal Government and the Great Plains Gasification Associates (GPGA), the Secretary of the Department of Energy (DOE) has the responsibility to provide to the Borrower and the Project Administrator the Supplemental Environmental Programs (SEPs) that the Borrower must perform in conjunction with construction and operation of the Great Plains Gasification Project (GPGP). This report is concerned with the determination of the impact of the GPGP on groundwater, surface water and biological systems, specifically to candidate SEP research tasks in the ecological and environmental sciences. Research tasks are proposed and developed on the transport, transformation, persistence, fate, and effects of residuals from the GPGP on biological systems in proximity to the facility. Supporting information on cost, scheduling, and priorities is included.

9989 **(NP—4770119) DVGW annual report '82.** (Deutscher Verein des Gas- und Wasserfaches e.V. (DVGW), Eschborn (Germany, F.R.)). 1983. 141p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770119.

According to paragraph 2 of its statutes, the DVGW Deutscher Verein des Gas- u. Wasserfaches e.V. aims at promoting the gas and water utilities as to their technical and scientific aspects with special regard to safety and hygiene. It has also taken great efforts to master this task successfully in the year under report. The annual report for the year 1982 gives a survey of the manifold activities of DVGW on the level of Bund and Laender as well as on the European and international sector to its members and the interested public. In the 123rd year ot its existence the traditional (tasks of the DVGW like control equipment, standardization, testing, research and development, advanced training and exchange of experiences, have proved their importance to the same extent as before.

9990 **(NP—4900392) Fuels-future availability.** White, D.M. (Texas Governor's Energy Advisory Council, Austin (USA)). 10 Dec 1976. 14p. NTIS, PC A02/MF A01. Order Number DE84900392.

Economic impacts from the shift from natural gas onto coal occurring in many Texas industries are discussed relative to many state and national policy considerations. The author feels the logistics required to accomplish this shift will be substantial. Reasonable national, state, and local policies which will allow this shift to occur without undue economic or enviornmental hardships must be developed soon. Several recent studies have emphasized this need by pointing out that conversion to coal will not be limited by inadequate availability of coal and coal production capacity, but rather by the ability and willingness of industry to convert. This willingness will in large measure depend on the existence of reasonable governmental policies and incentives.

9991 **(PB—83-251736) Costs and effects of environmental protection controls regulating US phosphate rock mining. Information circular.** Balazik, R.F. (Bureau of Mines, Washington, DC (USA)). Jul 1983. 44p. NTIS, PC A03/MF A01.

This Bureau of Mines study identifies and examines the costs of Federal, State, and local environmental protection controls on domestic phosphate rock mining. The costs include the expenditures needed to comply with government regulations and the effects that these expenditures and regulations have on supply. The study analyzes costs of environmental impact assessments, air and water quality standards, reclamation laws, potential solid waste controls, and local government restrictions. In addition, an industry survey and the Bureau's Minerals Availability System (MAS) are used to evaluate land management policies that restrict access to phosphate resources.

9992 **(PB—83-261412) High moisture slurry tailings - final report.** Devenish, M.; Green, P.V. (Warren Spring Lab., Stevenage (UK)). [nd]. 44p. NTIS, PC AE04/MF E04.

This report has been prepared by Warren Spring Laboratory for the Department of the Environment under a repayment contract. The views expressed are not necessarily those of the Department of the Environment. A three year research program investigating possible techniques of dewatering and strengthening slurry wastes with high moisture contents, deriving from the salt-processing industries in Cheshire, is reported. This program followed a study based on the Ashington-Woodhorn land reclamation scheme and was originally intended to be field oriented, but resource limitations resulted in emphasis on laboratory work.

9993 **(PB—83-262626) Toxic substances control act (TSCA) report to congress for fiscal year 1982. Annual report.** (Environmental Protection Agency, Washington, DC (USA). Office of Toxic Substances). Jan 1983. 22p. NTIS, PC A02/MF A01.

The report to Congress summarizes progress made by the Environmental Protection Agency in implementing Toxic Substances Control Act.

9994 **(PB—83-263061) Technologies and management strategies for hazardous waste control. Summary report.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Mar 1983. 57p. NTIS, PC A04/MF A01.

This summary presents the findings and conclusions of OTA's analysis of the Federal program for the management of nonnuclear industrial hazardous waste--an issue that has now reached national prominence and widespread congressional attention. OTA's findings and conclusions concerning the technical components of the Federal hazardous waste program complement current activities which have focused more on administrative problems and issues. Our work offers a number of opportunities, at this critical time, for examining solutions to national hazardous waste problems. The focus of the study was to be on technological options for managing hazardous waste at operating facilities, technical means to address the problem of uncontrolled and possibly abandoned hazardous waste sites, and the technical adequacy of the Federal regulatory program.

9995 **Current status and direction of waste repositories.** Bennett, J.W.; Ballard, W.W. (U.S. Department of Energy, Washington, DC). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2176-2178(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This paper describes, in broad terms, the interrelationship of the several regulations and recent legislation governing the National Waste Terminal Storage Program. The schedules of the first and second repositories are detailed, as are the interactions between the Federal, State, and local governments. Limited portions of the Nuclear Regulatory Commissions regulations and the Environmental Protection Agency's standard are discussed to the extent that they affect the development schedules.

2904 Natural Resources

REFER ALSO TO CITATION(S) 10146

9996 **(NP—4770120) Land use survey for Austria - basic instrument to determine and to safeguard natural and economic resources in terms of land, especially with regard to energy recovery from biomass. 1st project stage.** (Oesterreichisches Inst. fuer Raumplanung, Vienna). Dec 1981. 57p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84770120.

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In Austria, a comprehensive up-dating of cadastre and land register has been tackled. Besides the effect of rationalization, the data related to ground and land are meant to provide an up-dated survey on structure and area utilization by means of a joint keeping of cadastre and land register in the form of a landed-property data bank.

9997 **(PB—83-253336) Water transfers from agriculture to industry.** Little, R.L.; Greider, T.R. (Utah State Univ., Logan (USA). Inst. of Social Science Research on Natural Resources). Jun 1983. 169p. NTIS, PC A08/MF A01.

The large scale transfer of water usage from agriculture to industry tranforms a farming to a mining or industrial based economy and brings major social change. In order to develop a better understanding of the process, data were collected between 1980 and 1982 on the social effects of transferring water from agriculture to power production in two areas of Utah: Millard County near Delta and Emery County around Castledale. Questionnaires were mailed to water sellers and non-sellers, and interviews were conducted with community leaders. The results indicate considerable variation between the two areas. Nevertheless, roughly half the water sellers in both areas were agriculturalists, and the vast majority were long-time residents. In spite of the new-found cash, most sellers intended on remaining in their communities. Few intended on investing in more efficient irrigation systems. The two areas differ dramatically in their satisfaction with the process for negotiating water sales.

9998 **Advanced thermal sensor system development via shuttle sortie missions.** Angelo, J.A. Jr. (Los Alamos National Lab., NM); Ginsberg, I.W. pp 417 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

2905 Research, Development, Demonstration, And Commercialization

REFER ALSO TO CITATION(S) 9557

9999 **(DOE/CH/10122—18) Midwest Appropriate Technology Small Grants Program: management analysis.** (ESG, Inc., Atlanta, GA (USA)). Oct 1983. Contract AC02-82CH10122. 65p. (ESG—83108). NTIS, PC A04/MF A01. Order Number DE84004482.

This report reviews 84 projects conducted with DOE funding. The projects cover a number of energy-related topics, including biomass conversion, solar energy, wind energy, energy education, energy conservation, and recycling. In an effort to assist DOE-Chicago in analyzing what types of grantees were more successful and why, the projects were ranked and grouped by several variables. To determine if particular characteristics functioned to make one project more successful than another, several statistical tests were conducted. While the results of quantitative testing are somewhat offset by the subjective nature of the project rankings, some patterns did seem to develop: The overall distribution of the projects showed a normal division: 23% superior, 55% average, and 23% poor. No particular grantee type was significantly more successful than the others, but colleges and universities did have fewer highly ranked projects than any other group. Michigan had proportionately more superior projects; Illinois and Ohio proportionately fewer. Grant awards over $40,000 yielded fewer superior projects.

10000 **(ILL-RA—1982) Annual report 1982.** (Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)). [nd]. 173p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE84750295.

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This report deals with the different theoretical and technical activities at the ILL during the year 1982.

10001 **(ILL-RA—1983(Ann.)) Annual report 1982. Annex.** (Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)). [nd]. 484p. NTIS (US Sales Only), PC A21/MF A01. Order Number DE84750296.

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This is the scientific annual report 1982 of the ILL on R and D activities of the different colleges: fundamental and nuclear physics, inelastic scattering in simple solids, crystallographic and magnetic structures, fluids and amorphous substances, imperfections, biology, chemistry, theory. Abstracts of the publications published during the year are presented.

10002 **(NP—3770172) Pollution control in the city of Hamburg.** (Handelskammer Hamburg (Germany, F.R.). Abt. Industrieller Dienst). 1980. 116p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83770172.

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In spite of being a densely populated industrial region Hamburg can present a positive balance as to air pollution abatement, waste disposal, and landscape planning. Providing better measures for environmental protection means a challenge to industry. By the help of 42 examples from industrial firms of Hamburg it is demonstrated how the legal requirements can be met. Solutions on the service sector were developed which aims at recycling metals, paper, plastics, rubber and used oil.

10003 **Data-gathering methodology for modeling energy research development and demonstration.** Meyer, M.A.; Booker, J.M.; Cullingford, H.S.; Peaslee, A.T. Jr. (Los Alamos National Lab., NM). pp 745-746 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

2906 Nuclear Energy

REFER ALSO TO CITATION(S) 9447, 9827, 9828, 9880, 9971

10004 **(CONF-8311111—1) Professional development for nuclear power programs in developing countries.** Kanter, M.A. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE84004039.

From 2. inter-university energy symposium; Santiago, Chile (14 Nov 1983).

Countries entering nuclear power programs for the first time find that inadequate planning for the development of trained manpower is a critical factor in the success of their programs. This requires the early training of a team for the planning and acquisition effort to be followed by training for the supervision of construction. In addition, there is the more readily recognized training for operation. Typical manpower needs for such projects have been documented by the International Atomic Energy Agency. The basic academic training of engineers and scientists, which should be available within the country; advanced academic training, which is often secured in institutions abroad; specialized training abroad by international agencies; specialized training by the vendors of nuclear equipment; and the development of indigenous training. This paper outlines all of these avenues but will concentrate on the training available through international agencies and on the development of indigenous training capability.

10005 **(DOE/NE—0048/4) UPDATE: nuclear power program information and data, July-September 1983.** (Department of Energy, Washington, DC (USA). Assistant Secretary for Nuclear Energy). Nov 1983. 93p. (PB—83-911504). NTIS, PC A05/MF A01. Order Number DE84004266.

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UPDATE is published to provide a quick reference source on the current status of nuclear powerplant construction and operation in the United States and for information on the fuel cycle, economics, and performance of nuclear generating units. Similar information on other means of electric generation as related to nuclear power is included when appropriate.

10006 **(INIS-mf—8288) Technological risks and social conflicts. Political risk strategies in the debate of nuclear energy. Text volume.** Conrad, J.; Krebsbach-Gnath, C. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). Dec 1980. 175p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704755.

Research on acceptance, perception and assessment of risks clearly shows that perception of risk by the public is based more on subjective assessments than on scientifically objective risk values. Risk perception by the public is influenced by a number of factors. Risk is still a central point in the conflict and always plays a major role in the opposition toward dangerous technologies. Risk forms the thematic focus for the controversy. The development of the actual conflict, the positions, interests, adaptation problems and processes of the various societal institutions, the conditions, prospects, and forms of antinuclear protest and the subjects and structures, symmetries and changes of argument in the public discussion on nuclear energy are analyzed and represented in detail in this report.

10007 (INIS-mf—8649, pp 36-64) **Safety: Science and technique in social problems.** Smit, W.A. 1982. (In Dutch). NTIS (US Sales Only), PC A08/MF A01. (CONF-8205225—).

From Conference on nuclear energy - what do you know about it; Enschede, Netherlands (11 May 1982).

The author describes in a simple and clearly written Dutch text the relationship between scientific and technical knowledge and the social problems concerning the safety of nuclear energy. He begins with the cooling system of reactors and the safety aspects of the associated pumps. He uses this example to illustrate that the quantative determination of failure risks need not necessarily be relevant for judging the acceptance of the risk but is always relevant as a method of judging the effect of technical improvements on safety values. The author then considers the radiological effects of the operation of a nuclear plant by presenting the doses of radioactivity released if a reactor is operating normally, if there are technical problems and in the case of accidents. The corresponding biological effects on man are also presented and in an appendix the radiological consequences of reactor accidents are considered in some detail. He describes a number of models used in such calculations - for metereological distribution, dosimetry for internal radiation, cancer induction - to illustrate the margins of uncertainty in the predictions. According to the author safety aspects should not just be seen as a purely technical problem, starting with the fact that nuclear energy is desirable and then ensuring that all required safety regulations are met. Safety aspects are a social problem and should be considered by first discussing whether nuclear energy is acceptable, taking into consideration such consequences as the effects of possible accidents and the long term effects of reactor operation. (C.F.).

10008 **(INIS-mf—8649) Nuclear energy - what do you know about it.** (Technische Hogeschool Twente, Enschede (Netherlands)). 1982. 158p. (CONF-8205225—). NTIS (US Sales Only), PC A08/MF A01. Order Number DE84780051.

From Conference on nuclear energy - what do you know about it; Enschede, Netherlands (11 May 1982).

Separate abstracts were prepared for individual papers.

10009 (Juel-Conf—17, pp 7-16) **Energy supply of the Federal Republic of Germany with or without nuclear energy.** Jaek, W.; Voss, A. Jan 1983. (In German). Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

In Benefits and risks of nuclear energy.

Based on the existing domestic energy reserves, the Federal Republic of Germany will not be in the position to forgo imports of energy supplies neither on a middle nor long-term basis. The considerable, domestic coal reserves make a renaissance of coal as an energy source desirable. The symbiotic energy source of coal and nuclear energy acquires more and more a central significance. The geographic conditions of the Federal Republic of Germany makes only a very limited exploitation of solar energy possible. Of decisive importance will be new developments or a re-structuring of energy supply distribution.

10010 **(NUREG—0020-Vol.7-No.8) Licensed operating reactors. Status summary report, data as of 7-31-83. Volume 7, No. 8.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Nov 1983. 404p. NTIS, PC A18/MF A01 - GPO. Order Number DE84900728.

This document provides data on the operation of nuclear units as timely and accurately as possible. This information is collected by the Office of Resource Management from the Headquarters staff of NRC's Office of Inspection and Enforcement, from NRC's Regional Offices, and from utilities. The three sections of the report are: monthly highlights and statistics for commercial operating units, and errata from previously reported data; a compilation of detailed information on each unit, provided by NRC's Regional Offices, IE Headquarters and the utilities; and an appendix for miscellaneous information such as spent fuel storage capability, reactor-years of experience and non-power reactors in the US.

10011 **(NUREG—0540-Vol.5-No.9) Title list of documents made publicly available, September 1-30, 1983. Volume 5, No. 9.** (Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control). Dec 1983. 573p. NTIS, PC A24/MF A01 - GPO. Order Number DE84900589.

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This document is a monthly publication containing descriptions of information received and generated by the US NRC. This information includes (1) docketed material associated with civilian nuclear power plants and other uses of radioactive materials, and (2) nondocketed material received and generated by NRC pertinent to its role as a regulatory agency. The following indexes are included: Personal Author Index, Corporate Source Index, Report Number Index, and Cross Reference to Principal Documents Index.

10012 **(NUREG—0580-Vol.12-No.10) Regulatory licensing: status summary report, October 1-31, 1983. Volume 12, No. 10.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Nov 1983. 58p. NTIS, PC A04/MF A01 - GPO. Order Number DE84900692.

This document provides a review of the status of the progress of the licensing reviews for all construction permits, operating licenses, special projects and non-power reactor renewals under review, as reported to Congress.

10013 **(NUREG—0580-Vol.12-No.11) Regulatory licensing: status summary report, November 1-30 1983. Volume 12, No. 11.** (Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management). Dec 1983. 58p. NTIS, PC A04/MF A01 - GPO. Order Number DE84900587.

This document provides a review of the status of the progress of the licensing reviews for all construction permits, operating licenses, special projects and non-power reactor renewals under review, as reported to Congress.

10014 **(NUREG/CR—3430-Vol.1) Nuclear power plant operating experience. Volume 1. Annual report, 1981.** Silver, E.G.; Mays, G.T. (Oak Ridge National Lab., TN (USA)). Nov 1983. Contract W-7405-ENG-26. 395p. (ORNL/NSIC—215-Vol.1). NTIS, PC A17/MF A01 - GPO. Order Number DE84004142.

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The performance of the 71 operating power reactors in the US during the calendar year 1981 is analyzed, with particular attention to Licensee Event Reports (LERs), outages, power production, and occupational radiation exposures. Information about each reactor is presented as well as statistical analyses relating to systems and components causing outages. The three reactor types (BWRs, LWRs, and one HTGR) are separately considered to make meaningful comparions possible.

10015 **Nuclear energy in the Federal Republic of Germany: description and evaluation of assessments.** Krebsbach-Gnath, C. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). pp 51-61 of Summary and evaluation of the results of the symposium on the role of technology assessment in the decision-making process. Paschen, H. (Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.)). Berlin, Germany, F.R.; Umweltbundesamt (1983). (CONF-8210185—Summ.).

From International symposium on the role of technology assessment in the decision-making process; Bonn, F.R. Germany (19 Oct 1982).

Three major technology assessments of nuclear energy in the Federal Republic of Germany were discussed : - "Consequences of large-scale implementation of nuclear energy in the Federal Republic of Germany", conducted by the Abteilung fuer Angewandte Systemanalyse / AFAS (Division of Applied Systems Analysis) of the Kernforschungszentrum (Nuclear Research Center) Karlsruhe. - "Studies on technical, organizational and societal preconditions for risk handling in the field of nuclear energy", conducted by Batelle Institute e.V., Frankfurt a. M. - "Future nuclear energy policy", the work of the Enquete Commission (Committee of Inquiry) of the 8th German Bundestag (Federal Parliament).

2908 Waste Heat Utilization

REFER ALSO TO CITATION(S) 10086, 10096, 10149, 10168

10016 **(PB—84-104678) Cogeneration systems reliability data base feasibility study. Final report Aug 1982-May 1983.** Podlasek, R.J. (Podlasek (R.J.), Springfield, IL (USA)). May 1983. 52p. NTIS, PC A04/MF A01.

The study examined the feasibility of establishing a natural gas cogeneration reliability data base. The potential benefactors of a natural gas cogeneration reliability data base include cogeneration marketers, owner/operators, maintenance contractors, researchers, third party financiers and equipment manufacturers. In addition, cogeneration reliability data is useful to electric utility rate designers in the development of standby electric rates and to electric utility system planners in the calculation of loss of load probabilities. The seven reliability data base options identified were 1) testimonials; 2) operator roundtable discussions; 3) a statistical sample of units using operator provided data; 4) a statistical sample of units using remote data acquisition techniques; 5) all operators contributing system reliability data; 6) all operators providing both system and subsystem reliability data; and 7) root cause analysis of selected operational problems.

10017 **Effects of improved energy efficiency on U.S. energy use: 1973-80.** Hirst, E.; Barnes, R.W.; Cohn, S.M.; Corum, K.R.; Greene, D.L.; Hamblin, D.M.; Kulp, G.; Reister, D.B.; Vineyard, T.A. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN). *Energy (Oxford);* 7: No. 11, 897-907(Nov 1982). Contract W-7405-ENG-26.

Between 1973 and 1980, U.S. energy use grew at an average annual rate that was only one-tenth the pre-embargo rate. This dramatic change in energy growth was caused by a combination of rapidly rising fuel prices, slower economic growth, occasional shortages of fuels, and government and utility conservation programs. The paper examines the post-embargo period in terms of energy use in each of the major sectors: residential and commercial buildings, transportation, and industry. The analysis deals with two issues: what changes occurred in energy use during this period relative to pre-embargo trends and why these changes occurred. Energy use in 1980 (76 quads) was about 20 quads lower than pre-embargo trends would suggest. About half of this reduction was due to slower growth in economic activity. The remainder was due to improvements in energy efficiency, spurred primarily by rising fuel prices and also by government and utility conservation programs. The 1980 increase in overall energy effiency (10 quads) was due primarily to technical efficiency improvements and secondarily to operational changes.

2910 Conservation

REFER ALSO TO CITATION(S) 10044, 10055, 10064, 10071, 10173, 10175, 10176

10018 **(DOE/CS/22021—T1) BEPS equivalency study. Final report.** (Brabham, Kuhns, DeBay, West Palm Beach, FL (USA)). Feb 1983. Contract FG01-80CS22021. 118p. NTIS, PC A06/MF A01. Order Number DE84002121.

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To determine equivalency between the Florida Model Energy Efficiency Code for Building Construction (FMEEC) and the Federal Building Energy Performance Standards (BEPS). Commercial buildings and residential buildings were studied. The two codes were compared for equivalency for building types by calculating the estimated yearly energy consumption per square foot of conditioned floor area, for several reference buildings and several residences. Areas of differences were analyzed. A constant relationship existed between BEPS and FMEEC with respect to the commercial buildings, and residential buildings with minimal roof area.

10019 **(NP—4770111) Quantitative effects of energy conservation policy in the Federal Republic of Germany. Assessment of energy savings through 1985.** Karl, H.D.; Rammner, P.; Scholz, L. (Ifo-Institut fuer Wirtschaftsforschung, Muenchen (Germany, F.R.). Projektgruppe Energie, Rohstoffe, Technologie). 1982. 196p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE84770111.

In his letter dated 28th January 1980 the Federal Minister for Economic Affairs had commissioned the Ifo-Institute for Economic Research with a research project on the topic of "Evaluation of the Quantitative Effect of Energy Conservation Measures". The subject of the study is an evaluation of the energy conservation measures of already introduced energy-political measures. A cost-benefit analysis of the measures had not been planned. Estimations of efficiency are made in the following fields: voluntary energy conservation caused by consumer information, autonomons energy conservation by stimulation with prices/money, and energy conservation by administrative measures. What is understood by energy conservation in the sense of the task mentioned is the reduction of the market demand according to marketable energy carriers. The conservation rates are estimated for all measures and for every single measure, for every year separately and cumulated for the period until 1985. Because of the considerable methodical problems caused by the economic quantification of some measures the various approaches of investigation are described in detail and clearly explained. The present report of results is a summary.

10020 **(NP—4770112) Quantitative effects of energy conservation policy in the Federal Republic of germany. Assessment of energy savings through 1985.** (Ifo-Institut fuer Wirtschaftsforschung, Muenchen (Germany, F.R.). Projektgruppe Energie, Rohstoffe, Technologie). 1982. 573p. (In German). NTIS (US Sales Only), PC A24/MF A01. Order Number DE84770112.

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10021 **Qualitative response models and the estimation of energy savings from utility conservation programs.** Johnson, K.E. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN). *Energy (Oxford);* **8**: No. 10, 775-780(Oct 1983). Contract W-7405-ENG-26.

Reducing uncertainty in the measurement of energy-saving effects of conservation retrofit programs is the focus of this paper. Measuring the actual quantity of energy savings is an elusive goal. The goal of an evaluation of energy savings is to measure the difference between energy consumption of participant households and that of the same households in the absence of the program. Because the program exists, this difference can only be estimated. The authors present methodogies which can be used to approximate participant usage in the absence of a program. The first two models are currently applied in evaluating these conservation programs. The last are innovative models using qualitative choice techniques designed to correct for self-selection bias.

10022 **Policy implications of a successful energy conservation program in university buildings and dormitories.** McClelland, L.; Cook, S.W. (Institute of Behavioral Science, University of Colorado, Boulder, CO). *Energy and Buildings;* **5**: No. 3, 213-217(Jun 1983).

Electricity conservation programs based on social psychological principles produced savings from 3 to 19% in fouteen university buildings. The programs prompted physical and policy changes as well as changes in occupant activities. The authors recommend that conservation efforts in similar institutional settings focus on all types of resource waste, have clear official sanction, call upon building occupants to define conservation opportunities, publicize unfamiliar how-to-save-energy information, encourage allocation of responsibility for waste in particular areas to specific individuals, and be of short and definite duration, renewed periodically.

10023 **Energy efficiency and conservation in buildings: the use of indicators.** Schipper, L. (Energy and Environment Division, Lawrence Berkeley Laboratory, University of California, Berkeley). *Energy (Oxford);* **8**: No. 1/2, 7-14(Jan 1983).

The paper deals primarily with energy used in residential and commercial buildings. The commonly used yardsticks for energy efficiency and conservation are the total amount of energy spent and the ratio of energy to GNP in individual countries. Both indicator are misleading. They lead to pessimistic conclusions, which are wrong. Existing buildings were designed to optimize their economic value in terms of initial investment and cost of exploitation during their lifetime when energy was cheap. There is an enormous potential for improvement in newly designed buildings and this potential is being taken advantage of. The use of accurate indicators for assessing energy efficiency is discussed. These include energy spent per household (for residential buildings), energy per square meter (for commercial and public buildings), energy per pupil (for schools), with an additional sophistication to allow for climate (energy per degree day). An analysis of energy consumption in buildings, carried out for several countries, indicates a sustained improvement of the efficiency in the use of energy and paints a rather bright picture in contrast to the prevailing opinion based on false indicators.

10024 **Energy conservation: Reagan wastes a program.** Hirst, E. (Oak Ridge National Lab., TN). *Sierra Club Bulletin;* **67**: No. 5, 23-26(Sep 1982).

President Reagan's proposal to cut the Department of Energy's energy conservation program is discussed. From an analysis by Oak Ridge National Laboratory it was concluded that: energy use in 1981 was about 25% lower than it would have been if pre-oil-embargo trends had continued; at least half this improvement was a result of increased energy efficiency; past governmental programs have been cost-effective and beneficial, contributing to increased energy efficiency; and the prospects for future conservation programs, if they are continued, bright. To cut the energy conservation budget by 97% would be a move which ignores both evidence and analysis. (JMT)

2920 Supply, Demand, And Forecasting

REFER ALSO TO CITATION(S) 9370

10025 **(DOE/CS/10047—T8) Stockpile coordination project. Harvard Energy Security Program. Final report.** Devarajan, S.; Hubbard, R.G.; Weiner, R. (Harvard Univ., Cambridge, MA (USA)). 1 Oct 1983. Contract AT01-79CS10047. 83p. NTIS, PC A05/MF A01. Order Number DE84002091.

This report considers the response of other oil importers to the United States' SPR policy. The treatment models the behavior of public stockpiles in other countries as endogenous. Simple theoretical and more complex simulation models are used to compare a cooperative stockpile drawdown policy (among oil importers) to one in which each country acts in its own self-interest. Finally, a specific agreement is proposed that attempts to capture the benefits from cooperation.

10026 **Simple models for the consumption rate of fossil fuel.** Reister, D.B.; Rotty, R.M. (Institute for Energy Analysis, Oak Ridge Associated Universities, Oak Ridge, TN). *Energy (Oxford);* **8**: No. 4, 283-289(Apr 1983). Contract AC05-76OR00033.

Energy consumption models are useful in the analysis of many energy and resource problems. Fossil fuel consumption models are especially useful in forecasting future atmospheric CO_2 levels. Simple models are frequently used to develop scenarios. In CO_2 analysis, two logistic type models have been used to construct scenarios of fossil fuel consumption. In this paper, economic theory is used to derive a new model. The previous logistic type models are shown to be special cases of the new model.

2930 Policy, Legislation, And Regulation

REFER ALSO TO CITATION(S) 9336, 9580, 9828, 9949, 9972, 9977, 10760

10027 (CONF-821215—, pp 5-12) **Overview of current and expected changes in legislation and regulations.** Dennison, W.J. (Dept. of Energy, Washington, DC). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Two issues are discussed: (1) legal aspects of the Resource Conservation and Recovery Act regulations as they apply to DOE facilities and (2) prospective development of radionuclide emission standards by EPA under Section 112 of the Clean Air Act. It was suggested that EPA and DOE enter into a Memorandum of Understanding in order to define the respective responsibilities of the two agencies in these issues. In addition, exemptions from state regulation of the Clean Air Act should be sought whereever necessary in the interests of national defense. (JMT)

10028 (CONF-821215—, pp 95-104) **Panel discussion: hazardous waste management.** De Carlo, V. (Dept. of Energy, Washington, DC); Bresson, J.E.; Stas, N.J.; Wing, J.F.; Wright, S.R. Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Members of a panel discuss hazardous waste management activities at Albuquerque Operations, Bonneville Power Administration, Oak Ridge Operations, and Savannah River Operations. The

Bonneville Power Administration program to manage the disposal of PCBs in transformers and capacitors was presented in some detail. Also discussed was the exemption status of DOE facilities under the Atomic Energy Act.

10029 **(NP—4770100) Zimbabwe - energy situation 1981/82.** (Bundesstelle fuer Aussenhandelsinformation, Koeln (Germany, F.R.)). Jul 1983. 65p. (In German). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84770100.

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The energy situation of Zimbabwe is reviewed on the basis of some relevant data. Its energy policy is commented on, and developments in electric power generation are described as well as the trends observed for the various energy sources. Figures are given on external trade and the balance of payments.

10030 **Energy and environmental impact: what have we learned?.** Ritschard, R. (Lawrence Berkeley Laboratory, University of California, Berkeley, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2164-2166(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

More than a decade has passed since the Arab oil embargo of 1973-1974 signaled a new era in U.S. policy development, namely the formulation of the first comprehensive energy policy. Several attempts were made to develop the nation's first energy policy including President Ford's program to expand domestic supplies and President Carter's National Energy Plan (NEP1) that was embodied in the National Energy Act of 1978 (NEA). The general objectives of the NEA were to reduce U.S. dependence on oil and gas, especially when imported; to delay extensive reliance on nuclear sources of energy until questions of safety and disposal of nuclear wastes could be resolved; to use coal and its derivatives extensively in the near-and short-term and to develop a solar industry for the long-term. All of these strategies were supplemented by the national goal of energy conservation in all energy end use sectors. The NEA was severely criticized by energy industry leaders and others for emphasizing conservation and providing inadequate incentives to develop domestic supplies. With the change in administration after the 1980 election, a national energy plan was abandoned for a more amorphous "free market" system approach. This post election period (actually beginning in 1979) was also blessed with only moderate rises in energy consumption due in part to the higher energy prices, a nationwide recession and possibly to concerted efforts in all energy sectors to be more energy efficient.

10031 **Deutscher Bundestag - Verwaltung - Hauptabteilung Wissenschaftliche Dienste. Materialien. (Environmental policy in the 8th Deutscher Bundestag (Federal Parliament) and Bundesrat (Federal Council) (1976-1980)).** Bonn, Germany, F.R.; Deutscher Bundestag, Hauptabteilung Wissenschaftliche Dienste (1982). 216p. (In German). Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

This description of environmental policy is the follow-up to Vol 49 of the "Materialien" (material) (Environmental policy in the 7th Federal Parliament). It also covers the main dealings in the Bundesrat (Federal Council). References to terms especially when speeches are quoted, are related to the subject index of the "Verhandlungen des Dt. Bundestages und Bundesrates" ("Negotiations of the German Federal Parliament and Federal Council) which are the basis for the booklet mentioned above. Contents: general fundamentals, aspects of structural policy, scientific, technical and organisational fundamentals; international and bilateral cooperation, emission control, waste management, environmental chemicals, protection of nature and landscape, coastal and deep sea waters, nuclear energy.

2940 Fossil Fuels

REFER ALSO TO CITATION(S) 9219, 9313, 9314, 9320, 9327, 9327, 9334, 9336, 9337, 9338, 9342, 9355, 9369, 9370, 9372, 9383, 9988

10032 **(NP—4770115) Production profits.** (Wirtschaftsverband Erdoel- und Erdgasgewinnung e.V., Hannover (Germany, F.R.)). [nd]. 18p. (In German). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84770115.

The supply situation of the German petroleum and natural gas production industry has recently been shifted again into the focus of public interest. Statements are made which shall not bear closer examination. Thus, it is wrong when the following is maintained: - that the production profit of the branch amounts to more than 4 billion DM, - that the government skims off only 32% and the production industries do not pay any revenue taxes, - that the competition on the petroleum market is distorted and there is no equality of chances. By the help of the facts presented in this brochure the production industry correct their image.

2960 Electric Power

REFER ALSO TO CITATION(S) 9580, 9971, 10029, 10065, 10066, 10067, 10068, 10069, 10070, 10125, 10126

10033 **(CONF-8306162—1) ORNL integrated forecasting system.** Rizy, C.G. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 22p. NTIS, PC A02/MF A01. Order Number DE84003200.

From Conference on electric utility load forecasting; Annapolis, MD, USA (8 Jun 1983).

This paper describes the integrated system for forecasting electric energy and load. In the system, service area models of electrical energy (kWh) and load distribution (minimum and maximum loads and load duration curve) are linked to a state-level model of electrical energy (kWh). Thus, the service area forecasts are conditional upon the state-level forecasts. Such a linkage reduces considerably the data requirements for modeling service area electricity demand.

10034 **(DOE/AP/10036—T1) Role of electric power in the southeast Alaska energy economy. Phase II. 1981 Juneau energy balance.** (Kramer, Chin, and Mayo, Inc., Juneau, AK (USA)). Feb 1982. Contract AC85-81AP10036. 105p. NTIS, PC A06/MF A01. Order Number DE84004093.

The economic base for Juneau and its energy sources and geographic location has resulted in a pattern of energy usage that is atypical in Alaska and the Pacific Northwest. Juneau is a community with a high dependency on government for employment, little industrial activity and fewer driving opportunities than communities with more extensive highway networks. However, some significant shifts in the pattern of energy usage were discerned that may be significant. Among these observed changes in the pattern of energy usage, most significant is the shift from fuel oil to electricity for residential space heating. The total energy used per capita went up fractionally in the 3.5 year period while there were significant decreases in two sectors - residential and surface transportation. This savings was offset by increased levels of energy used in the commercial/industrial, government, marine and air transportation sectors. A third trend was the shift to wood as a source of space heating in residences. In the 1980 to 1981 energy year, wood played a significant role in the residential sector, comprising approximately 9% of the residential energy load. A fourth change was the dramatic rise in energy usage in the commercial/industrial sector and the smaller though still significant rise in the government sector.

10035 **(DOE/BP—188) Issue backgrounder: surplus power.** (USDOE Bonneville Power Administration, Portland, OR). Nov 1983. 19p. NTIS, PC A02/MF A01. Order Number DE84005010.

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Northwest has a multi-year surplus of firm power and seasonal surpluses of nonfirm energy. These forms of electricity are not the energy used to serve Northwest homes and businesses; they

are what's left over after needs are met. By selling nonfirm energy and surplus firm power, BPA and the region's utilities help keep power rates to Northwest homes and businesses lower.

10036 **(DOE/BP—191) Wholesale power rate schedules and general rate schedule provisions.** (USDOE Bonneville Power Administration, Portland, OR). Nov 1983. 48p. NTIS, PC A03/MF A01. Order Number DE84005331.

The following rates are discussed: priority firm power, industrial firm power, industrial Hanna power, firm capacity, emergency capacity, new resource firm power, surplus firm power and energy, nonfirm energy, energy broker, and reserve power. The provisions include adoption of revised schedules, types of BPA service, billing factors and adjustments, other definitions, application of rates udner special circumstances, and billing information. (DLC)

10037 **(DOE/EA—0228) Proposed Memorandum of Understanding between Bonneville Power Administration and Western Area Power Administration. Environmental assessment.** (USDOE Bonneville Power Administration, Portland, OR). Oct 1983. 53p. NTIS, PC A04/MF A01. Order Number DE84005333.

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BPA and Western have reviewed the proposed BPA-Western MOU for the sale of surplus firm power by BPA to Western and for transmission by BPA of Western purchases for compliance with legislative and executive mandates adopted to safeguard the quality of the human environment. Neither BPA nor Western have identified any unresolved conflicts over alternative uses of available resources. Since the surplus firm power sales portion of the Western MOU may be similar to contracts which may be offered to Southern California Edison, Los Angeles Department of Water and Power, and Pacific Gas and Electric, the cumulative effects were reviewed in this EA. Due to the protective language embodied in the contracts and the GCPs regarding the constraints on the FELCC and BPA's unilateral determination of available energy, the environmental and operational effects will be negligible.

10038 **(DOE/EIA—0040(83)) Typical electric bills, January 1, 1983.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Oct 1983. 317p. NTIS, PC A14/MF A01 - GPO. Order Number DE84004559.

Average costs of electricity to residential, commercial, and industrial sectors, as reflected in bills for January 1, 1983, in general, continued to rise over those reported a year ago. The increases in the price of electricity can be attributed to the continuing escalation in the costs of labor, goods, capital, and services to electric utilities.

10039 **(DOE/EIA—0226(83/09)) Electric power monthly.** (USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels). Sep 1983. 43p. NTIS, PC A03/MF A01 - GPO. Order Number DE84004641.

During September 1983, net generation by electric utilities in the Unites States was 195,426 gigawatthours (GWh). On a year-to-date basis, net generation at the end of September 1983 was 1.2 percent mor than for the same period in 1982. In September, coal accounted for 55.7 percent of all electricity produced, petroleum for 5.8 percent, gas for 14.3 percent, nuclear power for 12.7 percent, hydroelectric power for 11.1 percent, with the remaining 0.3 percent from geothermal, wood, and waste. In September 1983, electric utilities consumed 54,212 thousand short tons of coal. Petroleum consumption in September 1983 was 19,529 thousand barrels, while gas consumption was 298,540 million cubic feet. On a year-to-date basis, coal consumption at the end of September 1983 increased 3.6 percent from the same period in 1982, petroleum consumption decreased 6.4 percent, and gas consumption decreased 6.4 percent, and gas consumption decreased 11.3 percent.

10040 **(MTR—7518) Cost and market penetration analysis of selected fossil fueled electric power generating systems. Volume I. Draft final report.** Medville, D.M. (Mitre Corp., McLean, VA (USA). METREK Div.). Apr 1978. Contract AC01-76ET10469. 324p. NTIS, PC A14/MF A01. Order Number DE84002895.

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Life cycle costs of electric power generation and estimated market penetration achieved by a variety of fossil fueled power plants using both natural and synthetic fuels are computed. Major elements of the analytic approach involve computation of delivered prices of natural and synthetic fuels, computation of delivered costs of electricity for mine mouth and load center power plants, and estimation of the market penetration achieved by each type of power plant for base, intermediate, and peak load applications. The analysis is conducted on a regional basis for the period 1980 to 2010 under various assumptions concerning future growth in demand for electricity and the future fossil/nuclear generating mix.

10041 **(NP—4770108) Method of effectiveness evaluation of system control in electric power systems.** Kaiser, W. (Eidgenoessische Technische Hochschule, Zurich (Switzerland)). 1981. 153p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE84770108.

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The object of this thesis is the effectiveness evaluation of system control in electric power systems by means of stochastic simulation techniques. A method is proposed for the effectiveness evaluation of various functions of system control. Thus it becomes possible to estimate the benefit of an extension of a control center or to assess reasonable reliability figures for the components in the control system. The effectiveness of system control is measured by the variation of the reliability indices of the power system. In the first part the operational behaviour of the power system is discussed and an abstract model of operation is derived. This model of operation permits to model possible sequences of operation including the activities of system control and to study the influence of the interesting parameters. In the second part the proposed method is applied to differently operated test systems and the effectiveness of system control is discussed.

10042 **Evaluation of a community-based electricity load management program.** Kowalczyk, D.; Craig, P.P.; Cramer, J.C.; Dietz, T.M.; Hackett, B.; Levine, M.; Vine, E. (California Energy Commission, Sacramento, CA). *Energy (Oxford);* **8**: No. 3, 235-243(Mar 1983). Contract W-7405-ENG-48.

During the summer of 1980, Davis (CA) undertook a program to encourage residents to reduce peak electricity use. The program was initiated by the local utility company and carried a collective financial incentive: for every 1% reduction in peak electricity use, the utility would reward the city $10,000 up to a maximum of $100,000. The paper discusses the program and evaluates its effects during the first experimental summer of operation. Most of the strategies developed in Davis to reduce peak load also indirectly encouraged conservation during off-peak hours, and the program evolved, in effect, as a conservation program. Total electricity use for the Davis residential sector, adjusted for weather and prices, was reduced by about 7%, and the reduction of peak load was somewhat greater. The program was economically rewarding to residents, the city, and the utility. In addition, the program had other intangible impacts on general energy consciousness and community spirit.

2980 Consumption And Utilization

REFER ALSO TO CITATION(S) 9313, 9970, 9973, 9983

2990 Unconventional Sources And Power Generation

REFER ALSO TO CITATION(S) 9545, 9551, 9658, 9658

10043 (CONF-8211134—, pp 58-74) **Recent developments and experience in the use of alternative energy sources.** Schulz, H. 1983. (In German). NTIS (US Sales Only), PC A03/MF A01.

From Meeting on semi-liquid manure treatment, energy engineering and preservation of feeding stuffs; Vilshofen, F.R. Germany (9 Nov 1982).

The possibilities of using alternative energy sources (solar energy, waste wood, straw) and of heat recovery are reviewed, and experimental data are presented.

10044 (DOE/R4/10145—T1) **Renewable energy resource planning in Orange County: a summary of procedures used for renewable assessment. Piedmont Cresent Energy Project.** (North Carolina Univ., Chapel Hill (USA)). Sep 1980. Contract FG44-80R410145. 151p. NTIS, PC A08/MF A01. Order Number DE84005206.

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An outline of the general procedures followed are summarized in the accompanying flow diagram. It was discovered early on in the project however, that different resources and technologies should be targeted toward specific audiences, and that the disposition of the fuel source came under two district categories - free (such as sunlight, wind, etc.) and market (such as bio-mass fuels). As a result of this, strategies for development and/or implementation of a specific technology, required different participants. The overriding limitation for development was availability of capital. Federal funding programs were identified for hydro and alcohol production, tax credits for solar, wind and geothermal were also identified as were credits for conservation. But strategies to improve awareness of these sources were not developed fully due to limited time. The Orange County Energy Commission presently has this area under study as a part of the Public Outreach Program and Renewable Resource Development Program formulation. The Orange County Energy Commission will continue to pursue the intent of the original program and to work to implement the recommendations forwarded through the program.

10045 (LUTMDN/TMVK—3113/1-90/(1983)) **Future for fuelwood on the Swedish wood market.** Stroh, U. (Tekniska Hoegskolan, Lund (Sweden). Institutionen foer Vaermeoch Krafteknik). Feb 1983. 90p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751398.

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The purpose of the study is to analyse the traditional wood market with the objective of identifying major obstacles to a long-term stable build up of a fuelwood trade. The parties active on the wood market, suppliers, vendors and buyers/forest industries, are highly dependent on one another since they are all links in a production chain. At the same time integration developments in the market may also lead to conflicts of interest within one and the same organisation body. The organisation of the Swedish wood market is such that there is on the one hand a lack of balance between the annual cut and the demand for wood, and that on the other hand the proper size of the forest industry to ensure long-term sound economy is a matter of debate. It is suggested that a solution to those problems could be the key to a well functioning wood market and could give space to a development of the fuelwood trade. The fuelwood trade has emerged centered around large boiler plants, mostly serving as heat sources for municipal district heating systems. In generally, prices and delivery terms are stipulated in individually negotiated contracts, and normally, pricing is based on the net heating value. It is possible that such principles for pricing and measurement will not be practicable if fuelwood trade based on delivery of small quantities gains a larger share of the market. Such a development could however be attractive in view of the fact that the major forest areas are concentrated to regions where there are only few big district heating boilers and industrial customs. Much emphasis has been placed on supporting projects for conversion of boilers, hoping for stable wood supply to emanate spontaneously. However, the unsure nature of the market seems to demand an integrated approach devoting more attention to other fuelwood processing agents and it could also be essential that all parties involved are engaged actively in the development project.

30 DIRECT ENERGY CONVERSION

3001 Mhd Generators

REFER ALSO TO CITATION(S) 9761

10046 (ANL/MHD—83-1) **MHD heat and seed recovery technology project. Annual progress report, October 1981-September 1982.** (Argonne National Lab., IL (USA)). Nov 1983. Contract W-31-109-ENG-38. 131p. NTIS, PC A07/MF A01. Order Number DE84005438.

The MHD Heat and Seed Recovery Technology Project at Argonne National Laboratory is obtaining information for the design and operation of the steam plant downstream from the MHD channel-diffuser. The project goal is to supply the engineering data required in the design of components for prototype and demonstration MHD facilities. The work is being done in close cooperation with the National Heat Recovery-Seed Program, which is supported by the MHD Office of the Department of Energy. The other major contractors are Mississippi State University, University of Tennessee Space Institute, and Babcock and Wilcox. The primary effort of the HSR Technology Project at Argonne comprises experimental investigations of critical problem areas, such as (1) corrosion of metal alloys; (2) NO/sub x/ behavior in the radiant boiler and secondary combustor; (3) radiant boiler design to meet the multiple requirements of steam generation, NO/sub x/ decomposition, and seed-slag separation; (4) effects of solid or liquid seed deposits on heat transfer and gas flow in the steam and air heaters; (5) formation, growth, and deposition of seed-slag particles; and (6) character of the combustion gas effluents. The experiments are performed primarily in a 2-MW test facility, the Fossil Energy Users Laboratory (FEUL). Other project activities include laboratory studies of the corrosion resistance of commercial alloys for the MHD steam plant. Progress is reported. 75 references.

10047 (INIS-mf—8638) **Linear and nonlinear instability theory of a noble gas MHD generator.** Mesland, A.J. (Technische Hogeschool Eindhoven (Netherlands)). 4 May 1982. 168p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704734.

This thesis deals with the stability of the working medium of a seeded noble gas magnetohydrodynamic generator. The aim of the study is to determine the instability mechanism which is most likely to occur in experimental MHD generators and to describe its behaviour with linear and nonlinear theories. In chapter I a general introduction is given. The pertinent macroscopic basic equations are derived in chapter II, viz. the continuity, the momentum and the energy equation for the electrons and the heavy gas particles, consisting of the seed particles and the noble gas atoms. Chapter III deals with the linear plane wave analysis of small disturbances of a homogeneous steady state. The steady state is discussed in chapter IV. The values for the steady state parameters used for the calculations both for the linear analysis as for the nonlinear analysis are made plausible with the experimental values. Based on the results of the linear plane wave theory a nonlinear plane wave model of the electrothermal instability is introduced in chapter V.

10048 **A hybrid MHD system for early plants or retrofits.** Walter, F.E.; Ike, L.J. (The Montana Power Company, Butte, Montana). *Proceedings of the American Power Conference;* **44**: 468-472(May 1982). (CONF-820465—).

From 44. annual meeting of the American Power Conference; Chicago, IL, USA (26 Apr 1982).

The current status of MHD technology and the engineering data that will be available within the next few years are sufficient to design and construct a hybrid MHD plant in which an MHD power train and a conventional steam boiler power train can be integrated at the steam level. The proposed program will speed the development of commercial MHD power generation and reduce both the risk and cost of the development program to the Government and the involved utilities. The result will be a more expedient and more economic availability of the MHD power generation technology. The hybrid concept can prove the commercial viability of the MHD technology for both retrofit and early commercial plants. The inclusion of an MHD power generation cycle in the next MPC generating plant will reduce the demand for coal, meet all air quality and environmental standards and produce electricity at a cost competitive with existing methods and less expensively than unproven and uncertain future coal generating concepts.

3005 Fuel Cells

REFER ALSO TO CITATION(S) 9619, 9761

10049 **Application of advanced fuel cells for utility load leveling.** Krumpelt, M.; Ackerman, J.P.; Fee, D.C.; Pierce, R.D. (Chemical Technology Division, Argonne National Laboratory, Argonne, Illinois). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1619-1623(Aug 1983). (CONF-830812—). Contract W-31-109-ENG-38.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Three system designs are described and analyzed for Molten Carbonate (MCFC) and Solid Oxide (SOFC) Fuel Cells operating on natural gas. The two MCFC systems reach fuel to bus bar efficiencies of 50% HHV and can be ramped up or down over short time spans. The SOFC system is less efficient, but has fewer components and can also follow load variations. The effect of electrochemical fuel utilization on net system efficiencies and subsystem behavior is analyzed.

10050 **Evaluation of gas cooling for pressurized phosphoric acid fuel cell stacks.** Farroque, M.; Harry, R.W.; Kothmann, R.E.; Maru, H.C.; Skok, A.J. (Energy Research Corporation, Danbury, CT). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1607-1612(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Gas cooling is a more reliable, less expensive and a more simple alternative to conventional liquid cooling for heat removal from the phosphoric acid fuel cell (PAFC). The feasibility of gas cooling has already been demonstrated in atmospheric pressure stacks. This paper presents theoretical and experimental investigation of gas cooling for pressurized PAFC. Two approaches to gas cooling, Distributed Gas Cooling (DIGAS) and Separated Gas Cooling (SGC) were considered, and a theoretical comparison on the basis of cell performance indicated SGC to be superior to DIGAS. The feasibility of SGC was experimentally demonstrated by operating a 45-cell stack for 700 hours at pressure, and determining thermal response and the effect of other related parameters.

10051 **Fuel cell propulsion systems for small transportation vehicles.** Frank, J.A.; Altseimer, J.H.; Nochumson, D.H. (Los Alamos National Laboratory, Los Alamos, NM). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 1425-1430(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Results are presented for small industrial vehicles, automobiles, and medium-sized trucks. Fuel cell systems were compared to competing technologies on economic and non-economic grounds. The criteria considered included capital cost, levelized life cycle cost, emissions and safety. The industrial vehicle used was a 1815 kg (4000-lb) capacity fork-lift truck. Indoor and outdoor cases were considered. Results indicate that fuel cells can compete at costs approximating their present costs. The automobile used was a five-passenger sedan in consumer and fleet operation. For competitiveness, fuel cell costs must drop to near or below minimum projected costs. The medium-sized truck considered was a 6800 kg (15,000-lb) GVW delivery van used by United Parcel Service. The fuel-cell is competitive at costs slightly below minimum projected costs. Capital costs for fuel-cell-powered automobiles and delivery vans are considerably higher than for ICE-powered vehicles.

10052 **Fuel cell propulsion systems for large vehicles: buses, freight locomotives, and marinecraft.** Altseimer, J.H.; Frank, J.A.; Nochumson, D.H. (Los Alamos National Laboratory, Los Alamos, NM). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 1435-1440(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

A recent Los Alamos study assessed the use of fuel cell systems in transportation vehicles. Study results for buses, railroad locomotives, and marinecraft are presented in this paper. Levelized-life-cycle costs and a figure-of-merit ranking technique for noneconomic criteria were used. Advanced fuel cell systems appear necessary for fuel-cell-powered buses to be costcompetitive. The application of near-term fuel cell technology to city buses might still be worthwhile because of air pollution considerations. For locomotives and marinecraft especially, the cost data was rather limited but certain design and operational features of fuel cell systems were found that could impact favorably on both railroad and ship applications. These are discussed.

10053 **Thickness of electrolyte layers on emersed Pt electrodes.** Wagner, F.T.; Ross, P.N. (Lawrence Berkeley Laboratory, Materials and Molecular Research Division, Berkeley, California). *Journal of the Electrochemical Society;* **130**: No. 8, 1789-1791(Aug 1983). Contract AC03-76SF00098.

This paper examines an electrochemical cell designed to allow the clean transfer of an electrode to a ultra-high vacuum surface analytical chamber. Determines the order of magnitude of the thickness of electrolyte remaining on the surface after emersion by using quantitative Auger electron spectroscopy (AES) applied to the non-volatile sodium residue from a HF-NaF aqueous electrolyte. Finds that no fluorine Auger signals were observed on properly emersed electrodes; higher levels of sodium and sometimes fluorine were observed in the capillary separation spot or when improper draining left visible droplets in the interelectrode gap; and attempts to emerse the crystal by dropping the counter-reference assembly vertically away from it left larger electrolyte drops on the surface.

10054 **The Hall-Heroult cell: some design alternatives examined by a mathematical model.** Lympany, S.D.; Evans, J.W. (Lawrence Berkeley Laboratory, Berkeley CA). *Metallurgical Transactions, [Section] B: Process Metallurgy;* **14B**: No. 1, 63-70(Mar 1983). Contract W-7405-ENG-82.

A previously developed mathematical model is used to study the effect of various design or operating changes on the performance of the Hall-Heroult cell. Performance is judged from the flatness of the interface between the aluminum and molten salt electrolyte and from the current efficiency. The former is sensitive to horizontal currents in the aluminum, and a novel cell design is suggested wherein the minimization of such currents leads to a nearly flat interface. Current efficiency is relatively insensitive to horizontal currents but dependent on riser design. Computations are carried out for end cells in potlines, for potlines of different spacings, and for cells containing different levels of aluminum.

32 ENERGY CONSERVATION, CONSUMPTION, AND UTILIZATION

REFER ALSO TO CITATION(S) 10044

10055 **(DOE/CS/69037—T1) Hawaii Non-Pilot States Program for the National Energy Extension Service. Final report.** (Hawaii State Government, Honolulu (USA)). 13 Mar 1980. Contract FG01-78CS69037. 2p. NTIS, PC A02. Order Number DE84005085.

Paper copy only, copy does not permit microfiche production.

Experiences with and recommendations arising from the National Energy Extension Service are presented briefly. (MHR)

3201 Buildings

REFER ALSO TO CITATION(S) 9385, 9667, 9667, 9669, 9670, 9672, 9695, 9702, 9711, 9713, 9715, 10021, 10022, 10022, 10023, 10023, 10143, 10161, 10174, 10176, 10177, 10934

10056 **(AD-A—131879/9) Acoustical benefits resulting from insulation and air leakage control in family housing units. Final report Jul 1981-Sep 1982.** Verschoor, J.D.; Haines, J.D. (Manville Service Corp., Denver, CO (USA)). Jul 1983. 183p. NTIS, PC A09/MF A01.

In an investigation sponsored by the Navy Family Housing Office, a series of tests were conducted to determine the improvement in acoustical sound transmission loss resulting from housing envelope energy conservation retrofits involving increasing the insulation level and/or controlling the air leakage. The data generated will be utilized in selecting energy conservation measures with maximum acoustical benefits, for retrofitting family housing units near aircraft operations, where excessive noise has been a problem. Three wall and two roof/ceiling test structures were constructed to be representative of those in present Navy Family Housing Units. The sound transmission loss and air leakage rate (resulting from an induced pressure differential) were determined for each basic construction. Subsequently, various retrofit measures were performed, designed to improve sound transmission loss, thermal performance and/or air leakage control. Following the retrofit, the improvement in air leakage rate and sound transmission loss were again determined.

10057 **(AD-A—132838/4) Measures of nonlinearity for segmented regression models. Technical summary report.** Goldberg, M.L. (Wisconsin Univ., Madison (USA). Mathematics Research Center). Aug 1983. 45p. (MRC-TSR—2549). NTIS, PC A03/MF A01.

A simple physical model of residential energy consumption provides the framework for an exploration of segmented regression models fit by least squares. The energy model is a generalization of a linear, single change-point model such as that considered by Hinkley. Some simple geometric measures of nonlinearity and nondifferentiability are proposed. These measures are related to the construction of approximate confidence regions for the parameters of a general segmented model. In addition, the relation shown between these measures and those proposed by Bates and Watts may be useful in analyzing continuously differentiable models.

10058 **(AD-A—133072/9) Fluidized bed air-to-air heat pump evaporator evaluation. Final report Oct 1982-Sep 19823 .** Ashley, J.L. (Naval Civil Engineering Lab., Port Hueneme, CA (USA)). Jul 1983. 23p. (NCEL-TN—1673). NTIS, PC A02/MF A01.

Frost formation of air-to-air heat pump evaporator surfaces reduces unit efficiency and restricts application. The use of a fluidized bed heat exchanger as an air-to-heat pump evaporator was investigated to determine if frost accumulation could be eliminated. Experimental investigations were conducted and the following results obtained: (1) frost accumulation was insignificant with fluidized bed temperatures below 32 F and (2) moisture accumulation from condensation resulted in unstable fluidized bed operation when the fluidized bed temperature was above 32 F. Several concepts - maintenance bed temperature below 32 F, reverse refrigerant flow, air-dry bed, nonadhering bed material, and ultrasonics - to solve the moist bed problem were evaluated, with no practical solution being developed. The use of a fluidized bed heat exchanger for air-to-air heat pump evaporators was determined not feasible.

10059 **(ANL/EES-TM—236-Vol.2) Residential fuel consumption patterns for poor, black, and elderly households: a comparative study. Volume 2. Analytical assessment.** Poyer, D. (Argonne National Lab., IL (USA)). Aug 1983. Contract W-31-109-ENG-38. 108p. NTIS, PC A06/MF A01. Order Number DE84005226.

This document provides a baseline forecast of residential energy consumption for the period of 1980 to 1990. In addition to highlighting differences in energy consumption patterns for different population categories, an initial exposure to Argonne's Minority Energy Assessment Model (MEAM) is provided by example. No specific policy or program is considered, and the results are presented with a purely heuristic purpose in mind. The model is still under development, although the essential elements are now in place. It must be emphasized that MEAM still requires fine tuning. Forecasts of energy consumption patterns, energy expenditures, energy expenditure share of income, and impact of changing energy price on economic well-being are given for three target population categories - poor, black, and elderly - and for the nation as a whole.

10060 **(BFR-T—46-1982) Influence of the dwelling habits on the consumption of energy in small houses.** Lundstroem, E. (Statens Raad foer Byggnadsforskning, Stockholm (Sweden)). 1982. 36p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751406.

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Energy consumption varies a great deal between dwelling houses which are built technically similar in the same type of environment. The difference of the consumption in a year can be up to 1 to 2, i.e. between 15 000 and 30 000 kWh in this context. It is due to the fact that the housing habits play a determining part in the energy use. Most often a relationship can be seen, in a high consumption of electric power versus high consumption of water. The importance of the building technique of the total use of energy in a one-family house is overestimated. The use of water and electricity have a certain connection. The habits of housekeeping, which give a difference in water use form an important factor to judging the appropriate actions of the reduction of energy consumption in a house. If the basic use of electricity is high, one may save energy better and cheaper with changed habits of living than technical changes of the dwelling house.

10061 **(BNL—51704) Survey of alternative fuels for residential and commercial space heating. Final report.** (Mueller Associates, Inc., Baltimore, MD (USA)). Apr 1983. Contract AC02-76CH00016. 112p. NTIS, PC A06/MF A01. Order Number DE84005627.

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A survey and assessment of alternatives to No. 2 fuel oil and natural gas for space heating in the residential and light commercial sectors are presented. This work focused on existing heating equipment, storage and distribution systems, and their potential ability to accommodate alternative fuels currently available or anticipated to be available in the future. Information is provided on characteristics of the residential and commercial sectors, fuel use by these sectors, and an overview of representative equipment characteristics. Alternative fuels are identified and their properties are discussed in the context of their influence on current equipment systems. Information of near- and far-term fuel availability is provided as well as relative fuel costs. A fuel evaluation/ranking methodology was developed and applied to assess technical, environmental, health, safety, fuel availability, and cost considerations. As would be anticipated, the results from applying this methodology indicate that those alternative fuels most closely resemble currently used fuels ranked high, while the fuels that ranked lowest, coal mixtures and waste fuels, indicate that considerable technical obstacles remain before these fuels can be used on a widespread basis.

10062 **(DOE/CS/20271—3) Occupancy analysis: design and operational energy studies in a new high-rise office building. Volume 3.** (Tishman Research Corp., New York (USA)). Oct 1983. Contract AC02-79CS20271. 96p. NTIS, PC A05/MF A01. Order Number DE84005455.

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The objective of this analysis, is simply to: determine how energy consumption varies as a function of building occupancy and utilization. This analysis is primarily involved with the relationship between occupancy patterns and energy consumption. It also addresses the relationship between building functional use (e.g., office, computer, parking, and food service) and energy consumption. This

study investigates variations in use and energy consumption during (1) the period of building startup from pre-occupancy through initial occupancy to full occupancy, and (2) daily and night occupancy for weekdays, weekends, holidays, and vacation periods. The report includes an investigation of the relationship between specific functional uses, systems requirements for those functions, and energy consumption.

10063 **(DOE/NBM—4004078) Your home energy audit: the first step to more energy-efficient living.** (Oak Ridge National Lab., TN (USA); Solar Energy Research Inst., Golden, CO (USA)). 1980. Contract W-7405-ENG-26. 29p. NTIS, PC A03/MF A01. Order Number DE84004078.

This booklet, used with your Audit Results, will help you decide the next steps you can take toward more energy-efficient living. The booklet presents information about you and your family - how you use energy, what it costs, and what you can do to cut back on your energy use and save money in the process.

10064 **(DOE/NBM—4004262) Resource materials developed in support of the residential conservation service rule issued on November 7, 1979.** Ehrenshaft, A.R.; Mixon, W.R.; Karnitz, M.A. (Oak Ridge National Lab., TN (USA)). May 1983. Contract W-7405-ENG-26. 9p. NTIS, PC A02/MF A01. Order Number DE84004262.

The original Rules for the Final Regulations establishing the Residential Conservation Service Program (RCS) were published on November 7, 1979. A Revised Final Rule for the RCS Program was published in the June 25, 1982 Federal Register. This list is a compilation of materials which were produced by DOE and its contractors to provide regulatory and technical support to the RCS Program before it was revised by the new Rule issued in 1982. The Technical References Section describes some of the research projects that served as a basis for the development of the RCS Model Audit and the installation standards for conservation measures.

10065 **(DOE/RG/08084—T1) North Carolina Rate Demonstration Project. Project Library. Part 1.** (Carolina Power and Light Co., Raleigh, NC (USA)). Jul 1980. Contract FC01-77RG08084. 618p. NTIS, PC A99/MF A01. Order Number DE84004185.

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The following exhibits are included: change order; sample customer log; direct testimony of Robert M. Spann, ICF, Inc.; description of approaches to time-of-day electricity pricing; testimony of Allen Miedema and S.B. White; customer education; data collection and editing procedures; data delivery schedule; usage data files for experimental period; field interviewer's manual (pre-experimental survey questionnaire; code book (pre-experimental survey questionnaire); documentation for initial survey file; field interviewer's manual (post-experimental survey questionnaire); and editing instructions (post-experimental survey questionnaire).

10066 **(DOE/RG/08084—T1-Vol.1) North Carolina Rate Demonstration Project: Blue Ridge Electric Membership Corporation. Volume I. Design and implementation.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Jun 1980. Contract FC01-77RG08084. 287p. NTIS, PC A13/MF A01. Order Number DE84004172.

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The BREMC study was conducted to observe the effect of a time-of-use electricity rate schedule on household electricity consumption. Under time-of-use (TOU) rates higher prices are charged for electricity used during those times when demand and system costs are higher; and lower prices when demand and system costs are lower. In this project 102 residential customers were placed on a seasonal time-of-use electricity rate for a 12-month period beginning in October 1977. The experimental rate schedule used three daily rating periods during the winter and two during the summer. A total of 98 customers on the existing rate served as a control group. This volume discusses the experimental design and data collection procedures.

10067 **(DOE/RG/08084—T1-Vol.2) North Carolina Rate Demonstration Project: Carolina Power and Light Company study. Volume II. Results and conclusions.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Sep 1980. Contract FC01-77RG08084. 444p. NTIS, PC A19/MF A01. Order Number DE84004171.

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The Carolina Power and Light Company Rate Demonstration Project was conducted to observe the effects of time-of-use electricity rates on household electricity consumption. Under time-of-use (TOU) rates higher prices are charged for electricity used during those times when demand and system costs are higher; and lower prices, when demand and system costs are lower. In this project, 514 residential customers were placed on 11 seasonal TOU electricity rates for periods of 14 to 18 months starting October 1977 and February 1978 and ending in May 1979. This volume presents the results of the study analyses and the examination of the post-experiment questionnaire.

10068 **(DOE/RG/08084—T2-Vol.2) North Carolina rate demonstration project. Blue Ridge Electric Membership Corporation. Volume II. Results and conclusions.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Jun 1980. Contract FC01-77RG08084;FC01-77RG08116. 276p. NTIS, PC A13/MF A01. Order Number DE84004187.

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This is Volume II of the final report on the Blue Ridge Electric Membership Corporation (BREMC) study, one of two studies comprising the North Carolina Rate Demonstration Project, which was carried out by the North Carolina Utilities Commission, its subcontractors, and participating utilities. Purposes were: (1) to observe and analyze the effects of time-differentiated or time-of-use electricity prices when implemented in the most realistic manner possible; (2) to forecast the effects of such a rate; and (3) to analyze the costs, benefits, the feasibility of implementing such rates in North Carolina. The first volume summarized the background, planning, and design of the BREMC study. This volume contains the comparative analysis of the results, the regression analysis, and the examination of the post-experiment survey questionnaires.

10069 **(DOE/RG/08084—T3-Vol.1) North Carolina rate demonstration project. Carolina Power and Light Company study. Volume I. Design and implementation.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Sep 1980. Contract FC01-77RG08084;FC01-77RG08116. 273p. NTIS, PC A12/MF A01. Order Number DE84004170.

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The Carolina Power and Light Company Rate Demonstration Project was conducted to observe the effects of time-of-use electricity rates on household electricity consumption. Under time-of-use (TOU) rates higher prices are charged for electricity used during those times when demand and system costs are higher; and lower prices, when demand and system costs are lower. In this project 514 residential customers were placed on a number of seasonal time-of-use electricity rates for periods of 14 to 18 months starting October 1977 and February 1978 and ending in May 1979.

10070 **(DOE/RG/08084—T3-Vol.2) North Caroline rate demonstration project. Blue Ridge Electric Membership Corporation study. Project library. Volume 2.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Jan 1980. Contract FC01-77RG08084. 373p. NTIS, PC A16/MF A01. Order Number DE84004183.

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This volume contains the following exhibits: change order; sample customer log; format of usage data in FEA experiment; direct testimony of Robert M. Spann, ICF, Inc., customer education planning; time-of-day billing system;final data delivery schedule; BREMC usage data files for experimental usage period; field interviewer's manual (pre-experimental survey questionnaire); code book (pre-experimental survey questionnaire) survey file documentation;field intervierer's manual (post-experimental survey questionnaire; and editing instruction (post-experimental survey questionnaire).

10071 **(NP—4900394) Testimony before the Senate Human Resources Committee concerning individual metering of apartment houses.** Cepeda, B. (Texas Governor's Energy Advisory Council, Austin (USA)). 3 Mar 1977. 5p. NTIS, PC A02/MF A01. Order Number DE84900394.

The cost of individual metering and its effects on energy consumption are described. (MHR)

10072 **(ORNL/Sub—80-13836/1-02) Assessment of internal combustion engines as drivers for heat pumps. Final report.** (Little (Arthur D.), Inc., Cambridge, MA (USA)). Jan 1984. Contract W-7405-ENG-26. 78p. NTIS, PC A05/MF A01. Order Number DE84005072.

The present suitability and future potential of internal combustion engines as drivers for heat pumps was assessed for residential and light commercial machines up to 100 kW output (or approximately 50 HP input). This assessment included: a review of prior I.C. engine experience in similar applications; the determination of current engine characteristics important to heat pump systems; a conceptual design and evaluation of system economic potential and operational features; and recommended options for further development. The study showed that the internal combustion driven heat pump is technically feasible with current engine technology and that economic potential is promising for larger sizes. Developmental options recommended include: system demonstration, annual performance simulation, production cost projections and market analysis.

10073 **(ORNL/SUB—42539/3) Heat transfer characteristics of a low density concrete wall. Final report.** Van Geem, M.G.; Fiorato, A.E. (Portland Cement Association, Skokie, IL (USA). Construction Technology Labs.). Aug 1983. Contract W-7405-ENG-26. 98p. NTIS, PC A05/MF A01. Order Number DE84004370.

Tests were conducted to evaluate thermal performance of three concrete walls. A normal-weight concrete wall, a structural lightweight concrete wall, and a low density concrete wall were tested in the calibrated hot box facility of Construction Technology Laboratories, a division of the Portland Cement Association. Experimental results are covered for the low density concrete wall. Test results for the normal-weight and structural lightweight concrete walls are described in separate reports. Each wall was subjected to steady-state, transient, and periodically varying temperature conditions in a calibrated hot box. Steady-state tests were used to define heat transmission coefficients. Data obtained during transient and periodic temperature variations were used to define dynamic thermal response of the wall. Thus, effects of heat storage capacity could be evaluated. Conductivities derived from calibrated hot box tests were compared with results from hot plate and hot wire tests. Hot wire tests were also used to evaluate the influence of moisture on thermal conductivity. Data obtained from dynamic tests were compared with steady-state calculations.

10074 **(PB—83-240481) Evaluation of the daylight and energy performance of windows, skylights, and clerestories.** Treado, S.; Gillette, G.; Kusuda, T. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Jun 1983. 27p. NTIS, PC A03/MF A01.

This paper examines the impact of several fenestration options on building space heating, cooling, and lighting loads. The use of skylights, windows, and clerestories is evaluated for a single floor commercial building, using the NBSLD-2 building energy analysis computer program, which possesses a fully integrated daylight model (DALITE). The evaluation focuses on the impact of daylighting on heating and cooling energy and equipment sizing, the potential reduction in electric lighting energy requirements through daylight utilization, the relative daylighting/thermal performance of skylights, clerestories, and windows, and the effect of building orientation on fenestration optimization and selection.

10075 **(PB—83-250241) Building technology publications, supplement 7: 1982. Final report.** Beavers, L. (National Bureau of Standards, Washington, DC (USA). Center for Building Technology). Jun 1983. 79p. (NBS-SP—457-7). NTIS, PC A05/MF A01.

This report presents NBS' Center for Building Technology (CBT) publications for 1982. It is the seventh supplement to NBS Special Publication 457, Building Technology Publications, and lists CBT reports issued during January 1 - December 31, 1982. It includes titles and abstracts of each CBT publication and those papers published in non-NBS media, key word and author indexes, and general information and instructions on how to order CBT publications.

10076 **(PB—83-264564) Energy efficiency of buildings in cities. Volume 2. Working papers. Paper No. 1. Fostering equity in urban conservation: utility metering and utility financing. Part 1. Utility metering. Part 2. Utility financing. Paper No. 2. Case studies of building energy efficiency in five U.S. cities: Buffalo, Des Moines, Jersey City, San Antonio, Tampa.** (Office of Technology Assessment (U.S. Congress), Washington, DC). Dec 1982. 219p. NTIS, PC A10/MF A01.

This volume contains working papers written for OTA to assist in preparation of the report, ENERGY EFFICIENCY OF BUILDINGS IN CITIES.

10077 **(PB—84-100924) Commercial cooking equipment improvement. Volume 4. Effects of ventilation on equipment performance. Final report Jul 1982-Feb 1983.** Himmel, R.L. (American Gas Association Labs., Cleveland, OH). May 1983. 57p. NTIS, PC A04/MF A01.

This report describes the effects of normal ventilation and excess ventilation on the thermal efficiency of commercial cooking equipment installed under ventilation hoods. It specifically discusses work with heavy-duty open top and hot top ranges and deep fat fryers. It was determined that the canopy-style hood significantly reduces the efficiency of gas-fired equipment with open burners or closed burners with high back shelves. Gas-fired and electric deep fat fryer efficiencies were not affected by the air flow under the canopy-style hood but the efficiency of an immersion tube type fryer with a direct connected ventilation system was significantly reduced. It was also determined that equipment and ventilation system configuration and usage are important to equipment efficiency.

10078 **(PB—84-101393) Development of freezer-storage facilities at Savoonga, St. Lawrence Island, Alaska. Final report.** Wentink, T. Jr; Leonard, L.; Johnson, P.R. (Alaska Univ., Fairbanks (USA). Inst. of Arctic Environmental Engineering). Oct 1975. 123p. NTIS, PC A06/MF A01.

The report covers a long project (April 1968 to April 1974) involving the design, construction, and testing of a large naturally-powered freezer for mammalian meat storage at Savoonga, St. Lawrence Island, Alaska. The story of the freezer is also long, but in brief, the results proved the refrigeration technical concept but revealed design deficiencies mostly in the circulation of the cold fluids (air and brine) and a fatal flaw of still undetermined origin in the tank structure (which failed). Nevertheless, the concept seems to be worth further testing and has promise for eventual routine use. It is hoped that this document will guide potential future designers and users of similar installations.

10079 **(PB—84-102060) Assessment of gas-fired commercial refrigeration. Final report Mar-Aug 1982.** Hynek, S.J.; Krepchin, I.P.; Harvey, A.C.; Demler, R.L.; Borhanian, H.H. (Foster-Miller, Inc., Waltham, MA (USA)). Feb 1983. 177p. NTIS, PC A09/MF A01.

Gas-fired commercial refrigeration is not common today. However, today's and tomorrow's gas engines (internal combustion, Stirling, gas turbines) could power cost-effective refrigeration systems. One key is effectively utilizing the prime mover's reject heat to economic advantage. Another is the capacity control afforded by a variable-speed prime mover. The best example of such a system is comparatively near-term. It serves the large and steady supermarket refrigeration market with an industrial-grade internal combustion engine driving an open-shaft reciprocating compressor. The gas engine's exhaust enables a reciprocating steam engine to boost shaft power by 20%.

10080 **(PB—84-104884) Technical and economic performance evaluation procedures for space-conditioning equipment. Final report Feb 1982-Jan 1983.** DeLima, H.; Tucker, B.; Bernstein, H. (Applied Management Sciences, Inc., Silver Spring, MD (USA)). Mar 1983. 103p. NTIS, PC A06/MF A01.

The objective was to develop a set of estimation procedures that would enable GRI's staff to compare the techical and economic performance of gas-fired heat pumps with other competitive space-conditioning equipment. Comprehensive step-by-step manual procedures were developed. The technical performance procedure is based on the ASHRAE Bin method and therefore can be used for estimating peformance at virtually any location for which bin weather data is available (over eighty cities). The procedure is applicable to single-speed, multispeed, and fully modulating compressors, hybrid heat pumps, gas-fired heat pumps gas-fired condensing furnaces, and all conventional heating/cooling equipment. Performance degradation due to cycling, defrosting, and refrigerant characteristics can be determined by these procedures. Annual energy-source type in terms of million Btu per year.

10081 **(PB—84-106798) Computer models for comparative assessment of cost and competitiveness of gas-fired space conditioning systems. Final report Jun 1981-Jun 1982.** Kashyap, H. (Sante Fe Corp., Alexandria, VA (USA)). 1982. 188p. NTIS, PC A09/MF A01.

The assessment of gas-fired space conditioning equipment for cost and competitiveness with other non-gas space conditioning equipment is important to the continued relevance of GRI research and development in this area. Existing methods of evaluating competing technologies include numerous methodological considerations which may impact upon results. The analysis of how each consideration impacts upon the results, and by what degree, needs to be conducted repeatedly in light of ever changing price forecasts, rates of inflation, and product efficiencies.

10082 **(SERI/SP—722-1289) Residential Conservation Service installer's guide.** Thor, P.W.; Gallagher, N. (USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC; National Engineering Lab. (NBS), Washington, DC (USA); Energyworks, Inc., West Newton, MA (USA); Oak Ridge National Lab., TN (USA)). 1981. Contract AC02-77CH00178. 128p. NTIS, PC A07/MF A01. Order Number DE84005373.

Background on the Residential Conservation Service (RCS) Program is presented for the contractor; the role of the contractor in this program is described; and the contractor is provided with the standards (required under RCS) for the installation of energy conserving measures. (MHR)

10083 **Building envelope research utilization.** Lundy, T.S. (Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2010-2014(Aug 1983). (CONF-830812—). Contract W-7405-ENG-26.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This paper details the technology transfer efforts of the National Program for Building Thermal Envelope Systems and Insulating Materials (BTESIM). These efforts, nonregulatory in nature, are based on the premise that correct technical information put into our very diffuse building construction and renovation system under the right circumstances of time, place, and audience will influence the decisionmakers and thereby result in improvements in energy efficiencies of the nation's building stock. This Research Utilization Task of the BTESIM Program is multifaceted in many ways with different professional disciplines and associated organizations, diverse business and economic interests including producers and distributors of building products and systems, education and training institutions, and building owners and managers. To date the efforts have included long-range educational thrusts for engineering and architectural faculty and students as well as shorter range thrusts involving information dissemination to specialized targeted audiences.

10084 **Development of a residential gas absorption heat pump.** Murphy, K.P.; Phillips, B.A. (Allied Corporation, Morristown, NJ). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1911-1914(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

A residential sized (25 KW) absorption heat pump has been developed using organic absorption pairs. Several different absorption pairs were examined during the course of the program. The final choice was R123 /SUB a/ ($CC1F_2CHC1F$) as the refrigerant and ETFE (ethyltetrahydrofurfurylether) as the absorbent. This pair was found to have good overall physical properties and performance equal to present commercial pairs. Based on thermodynamic analysis and actual performance tests, the R123a/ETFE pair will give a projected heating COP of 1.50 with a condensing flue system. The program has demonstrated the feasibility of the organic pairs in general. Combined operational experience of over 36,000 hours on these types of systems has been reached with a maximum of 13,000 hours on any single unit. The thermal stability of the absorption fluids was monitored during these tests and was found to be quite acceptable. A new solution pump design was developed for use with the organic pairs. Tests on this pump have achieved over 50,000 hours of continuous operation with minimal wear. The overall results of the program suggest that an absorption heat pump system using organic pairs would give a safe, long lived, efficient heat pump system.

10085 **Analysis of conservation and renewable options for new single-family residences.** Humblin, D.M.; Hudepohl, A.L.; Shelton, R.L.; Thomas, B.; Vineyard, T.A. (Oak Ridge National Laboratory, Oak Ridge, TN). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2050-2058(Aug 1983). (CONF-830812—). Contract W-7405-ENG-26.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This study determines and ranks the most cost-effective modes of providing space conditioning and water heating services to single-family residences in five cities - Phoenix, San Diego, Salt Lake City, Washington, D.C., and Boston. The engineering analysis consists of determining the energy consumption for variations of proto-typical houses. The monthly energy requirements for each residence are determined from DOE-2.1 analysis. The economic analysis involves ranking all the mechanical and architectural alternatives by their cost effectiveness over a 25-year study period. The rankings are determined from the utilization of the Buildings Innovations Economics Analysis Module. The decision criterion for comparing and coordinating alternatives in the pursuit of an economic optimum is the internal rate of return. Marginal efficiency of capital schedules reveal optimal investment paths.

10086 **Optimal cogeneration systems for high-rise office buildings.** Eto, J. (Energy and Environment Division, Lawrence Berkeley Laboratory, Berkeley, California). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1825-1831(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Alternative cogeneration plant configurations and operating strategies are examined with the use of DOE-2 computer simulations and net present value economic analyses to determine optimal cogeneration systems for high-rise office buildings. The examination takes the form of a case study for a hypothetical office building located in San Francisco, California, where a new regulatory attitude toward grid interconnection for cogenerators has begun to emerge. The conclusion of the study is that, under current economic conditions, the optimal cogeneration system is an internal combustion engine sized well-below the electrical requirements of the building and operated so that most of the by-product heat recovered is utilized. Notably, most of the systems fail to meet the efficiency requirement upon which receipt of the regulatory and economic benefits is predicated.

10087 **Responses to changing energy conditions among Massachusetts households.** Stern, P.C.; Black, J.S.; Elworth, J.T. (Commission on Behavioral and Social Sciences and Education, National Research Council, 2101 Constitution Avenue N.W., Washington, DC). *Energy (Oxford);* **8**: No. 7, 513-523(Jul 1983).

Survey data on 478 residential electricity consumers in Massachusetts are used to examine the effects of economic, demographic, structural, and attitudinal variables on energy-saving activity disaggregated into behaviorally distinct types involving energy efficiency improvements or curtailments. Home ownership, household energy bills, and personal norms for conservation all influence total energy savings, but different patterns of influence operate for different classes of behavior. Structural factors, particularly home ownership, were most important in influencing major efficiency improvements, while personal norms became increasingly important with less structurally constrained types of behavior, such as temperature settings. High and rising fuel prices indirectly produced some general energy savings, but the only classes of behavior to be directly affected were low-cost efficiency improvement and sacrifices of non-energy amenities. Some implications are discussed.

10088 **Lighting controls: survey of market potential.** Verderber, R.R.; Rubinstein, F. (Lighting Systems Research, Lawrence Berkeley Laboratory, University of California, Berkeley, CA). *Energy (Oxford);* **8**: No. 6, 433-449(Jun 1983). Contract AC03-76SF00098.

This study describes the impact of lighting management systems that dynamically control lights in accordance with the needs of occupants. Various control strategies are described: scheduling, tuning, lumen depreciation, and daylighting. From initial experimental results, the energy savings provided by each of the above strategies are estimated to be 26, 12, 14, and 15%, respectively. Based upon a cost of $0.05-0.10 per kWh for electric energy and a 2-, 3-, or 4-yr payback, target costs for a simple and a sophisticated lighting management system are found to be $0.24 and 1.89 per ft^2, respectively, for a cost-effective investment. A growth model, based upon an extrapolation of the increase in building stock since 1975, indicates that the commercial and industrial (C & I) building stock will grow from 40 X 10^9 ft^2 in 1980 to about 67 X 10^9 ft^2 by the year 2000. Even with the use of more efficient lighting components, the energy required for this additional C & I stock will be 307 X 10^9 kWh compared to the 230 X 10^9 kWh used today. Adopting controls would reduce this requirement to 243 X 10^9 kWh, an increase of only 13 X 10^9 kWh above current use. The specified information is used to analyze the economic impacts that using these systems will have on the lighting industry, end users, utility companies, and the nation's economy. A$1-4 X 10^9 annual lighting control industry can be generated, creating many jobs. The estimated return on investment (ROI) for controls for end users would be between 19 and 38%. Utilities will be able to make smaller additions to capacity and invest less capital at 7-10% ROI. Finally, the annual energy savings, up to $3.4 X 10^9 for end users and about $5 X 10^9 for utilities, representing unneeded generating capacity, will be available to capitalize other areas of the economy.

10089 **Building energy use compilation and analysis (BECA). Part B: retrofit of existing North American residential buildings.** Wall, L.W.; Dutt, G.S.; Goldman, C.A.; Rosenfeld, A.H. (Energy Efficient Buildings Program, Lawrence Berkeley Laboratory, University of California, Berkeley, CA). *Energy and Buildings;* **5**: No. 3, 151-170(Jun 1983). Contract AC03-76SF00098.

BECA-B assesses the technical performance and economics of energy conservation retrofit measures. The data collected thus far represent measured energy savings and retrofit costs for over 65 North American residential retrofit projects. The sample size within each project ranges from individual homes to 33 000 dwellings participating in a utility-sponsored program. The median value of space heating energy savings is 24% of the pre-retrofit consumption. For fuel-heated homes, the median cost of conserved energy is $3.66/GJ, substantially less than the U.S. average 1981 prices for purchased energy of $4.27/GJ for natural gas and $8.25/GJ for fuel oil. For ten of the eleven electric heat retrofits the cost of conserved electricity is less than the 1981 U.S. average price of 6.2 / kWh.

10090 **Building energy use compilation and analysis (BECA). Part C: conservation progress in retrofitted commercial buildings.** Ross, H.; Whalen, S. (Dept. of Energy, Washington, DC). *Energy and Buildings;* **5**: No. 3, 171-196(Jun 1983).

Data on actual energy use were compiled for 223 retrofitted U.S. commercial buildings and analyzed for several quantities of interest: average savings, average retrofit cost, correlation between cost and savings, type of retrofit attempted, etc. Dominant building types were schools and offices; nearly all buildings included operations and maintenance changes as part of the retrofit. Eighty-nine per cent of the buildings which saved energy by retrofitting achieved a payback (simple) in less than 3 years. Nine per cent of the buildings failed to save (generally because of improper maintenance), indicating there is some risk in conservation investment. Average savings for the entire sample were 20%, at an average cost of $0.62 per square foot. On a more limited subsample, energy savings predictions made by the auditors prior to retrofit were compared with actual energy savings. About 60% of the time, actual savings exceeded predictions. Data were available on 15 buildings for savings achieved over a number of years following the retrofit; in most cases the savings persisted, and even increased.

10091 **Absorption heat pump for domestic use.** Florette, M. pp 566-574 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The absorption heat pump has specific advantages compared with the compression heat pump. The research undertaken by Gas de France is in two parts, one part is the study of new fluids pairs and the other is concerned with the application technology. This research is both theoretical and experimental. The aim to build an absorption heat pump to replace central heating boilers (furnaces) for house heating.

10092 **Columbia's gas heat pump. Progress report.** Morse, W.F.; Cook, F.B.; Reid, E.A. Jr. pp 575-581 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The Columbia Gas System Service Corporation and the Gas Research Institute are jointly funding development of a double-effect absorption heat pump for the residential market. The performance targets for the heat pump are a COP/sub C/ of 0.80 and a COP/sub H/ of 1.6 including electric power consumption. Columbia and its subcontractors are fabricating a proof-of-concept prototype heat pump, which will be tested in late 1983. A manufacturer/licensee is needed for this technology to begin development of a packaged, pre-production prototype heat pump during 1984.

10093 **Development of a residential gas absorption heat pump.** Murphy, K.P.; Phillips, B.A. pp 582-589 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A residential sized (25 KW) absorption heat pump has been developed using organic absorption pairs. Several different absorption pairs were examined during the course of the program. The final choice was R123a ($CClF_2CHClF$) as the refrigerant and ETFE (ethyltetrahydrofurfurylether) as the absorbent. The program has demonstrated the feasibility of the organic pairs in this type of service. Combined operational experience of over 36,000 hours on these types of systems has been achieved with a maximum of 13,000 hours on any single unit. The stability of the absorption fluids was monitored during these tests and was found to be acceptable. A new solution pump was developed for the organic system. This has achieved over 50,000 hours of continuous operation with minimal wear. Based on thermodynamic analysis and actual performance tests, the R123a/ETFE pair will give a heating COP of 1.50 with a condensing flue system.

10094 **Detailed calculation model of a compression heat pump.** van Rij, M.L.D. (VEG-GASINSTITUUT n.v., Apeldoorn, Netherlands). pp 590-598 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

In order to enable predictions to be made of the characteristics of an air/water heat pump a detailed calculation model has been developed. The results obtained by means of this model have been verified against measurements on a laboratory-installed heat pump. The present article describes the most important equations used in the model. Further, some results of calculations made by means of this model are presented, such as the influence of the air temperature and the central heating water temperature on the COP and heat output. Combination of this heat pump model with a model of a gas engine and a number of dwellings yields predictions of annual gas consumption rates. On the basis of evaporator and condenser price curves and a gas price scenario the financially optimum configuration was computed using the net present value method. This optimum and the sensitivity of sub-optimal configurations regarding their cost-effectiveness are discussed.

10095 **Duplex Stirling heat pump development.** Beale, W.; Gedeon, D.; Penswick, B. pp 599-607 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A duplex Stirling heat pump for domestic heating, comprised of a free piston Stirling engine directly attached to a free piston Stirling heat pump, is in the first prototype stage of development. Prototype target performance is 10 kW heat delivered at -8° C ambient temperature, with a coefficient of performance of 1.5 (heat delivered/fuel higher heating value). Work so far has demonstrated operating stability and adequate performance in all components except for engine efficiency, which is still somewhat low. Heat pump component efficiency is at the desired level and is as predicted by computer modeling. A fully developed duplex Stirling heat pump will have the advantages of a single working fluid in a hermetically sealed space, only three moving components, stable operation over the entire temperature range, high thermodynamic performance, low noise, long life, and high cost effectiveness.

10096 **Free-Piston Stirling Engine: an advanced prime mover for advanced residential gas-fired equipment.** Goldwater, B.; Marusak, T.J. (Mechanical Technology Inc., Latham, NY). pp 608-619 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A newly developed prime mover, the Free-Piston Stirling Engine (FPSE), offers the unique blend of attributes required for residential energy-conversion systems. In 1975, Mechanical Technology Incorporated (MTI) established a company commitment to the development of FPSE's that could be coupled with a variety of linear components. Based on extensive hardware experience, MTI has verified the potential of the FPSE for meeting the stringent technical and economic requirements of the residential market. Since market requirements do not allow for improved system efficiency at the expense of reliability or operational convenience, MTI has incorporated a number of innovative reliability, life-enhancing design features into their FPSE's.

10097 **Investigation of working fluids for gas-fired absorption plants.** Bokelmann, H.; Ehmke, H.J.; Renz, M.; Steimle, F. (Universitaet Essen, Germany). pp 620-629 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

An experimental investigation of different new refrigerant-absorbent combinations has been carried out to determine their suitability as working fluid in absorption units. Experimental data on vapor pressure, solubility, viscosity, and thermal stability are given for selected working fluids with ammonia, methylamine, trifluoroethanol, R 22, R 123 a, and R 133 a as refrigerants. The results of experimental investigations are presented in tables and diagrams.

10098 **Thermodynamic process data for an absorption-type heat pump.** Muehlmann, H.P.; Wessing, W. pp 630-640 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Refrigeration cycle balances quoted in literature frequently represent the performance of the system for one set of operating conditions without accounting for heat losses. For this reason, tests were made to study refrigeration cycle behavior under variable operating conditions. In the case of an air-to-water absorption-type heat pump, the temperature of the ambient air used as the source of heat and the minimum flow temperature of the heat sink would be the critical parameters of the thermodynamic cycle. The first approximation of the design data for the heat pump subsystems (desorption, condensation, evaportation, absorption) supplied the input data for a second design calculation made to determine equilibriums, concentrations, mass flows and energy balances. The coefficients of performance determined from the energy balances for the three tests showed that the coefficients of fuel utilization could be increased, but that the optimum process would not necessarily be the process where the coefficient of fuel utilization is highest. The mass flow and energy balances from the tests allow the optimization of heat pump components and the improvement of heat pump control systems.

10099 **Analysis of hybrid residential heating systems on the basis of cost and life cycle cost efficiencies.** Patani, A.; Bonne, U.; Gustafson, G.J. pp 642-655 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Findings are presented on conditions and limits for possible operating and life-cycle cost savings of hybrid or bivalent heating systems relative to conventional combustion heating systems. These were analyzed by taking into account the furnace/boiler losses during prolonged periods of stand-by and other losses analyzed previously by the HFROST and HFLAME simulation models. It is found that add-on heat pump operating cost savings may accrue if R/sub C/, the dimensionless electric to natural gas cost ratio, is below 2.5 to 3.5, depending on heat pump and furnace efficiencies and heat pump sizing. Optimum balance points were found to be higher than those for heat pump only operation. Increasing furnace system efficiency shifted the R/sub C/ value at which savings accrue to a lower value. Higher values were obtained for increases in heat pump efficiency. For buildings with good internal communication with the furnace room, stack damper savings were large compared to those achievable with add-on heat pumps. R/sub C/ value and climate are the major regional factors that, together with the heat pump cost and reliability determine the potential benefits of add-on heat pumps. Analysis, on the basis of a newly derived Life Cycle Cost Efficiency, showed that installation of add-on heat pump systems generates savings for locations with R/sub C/ $\leqq$ 2. Local and off-peak rates need to be incorporated into the switch-over control for economic operation.

10100 **Exchanger for the simultaneous transfer of heat and moisture for a condensation boiler.** Marchal, D.; Salvi, P. pp 671-682 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The exchange process by direct contact between combustion products and a liquid is applied to a domestic gas boiler. It is shown how it is possible, by means of theoretical arguments, to optimize the boiler's design. A 10 kW capacity prototype was constructed and tested. When the temperature of water returning to the boiler is 40°C, a 90% efficiency (HHV) is obtained for maxi-

mum capacity, and 97% for the third of this capacity. Because of the high temperature level of the water leaving the boiler (90°C), the necessary oversizing of the radiators is less than 50%. The boiler was also operated with fuel oil instead of gas, and gave similar results.

10101 **Fully premixed natural gas burners for use in high thermal efficiency domestic boilers.** Pearson, E.J.; Saunders, T.G.; Hargreaves, K.J.A. pp 683-694 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Rising fuel costs and the need for higher utilization efficiencies have resulted in attention being directed towards the development of domestic appliances that utilize the latent heat contained in the flue gases by condensation of the water vapor. For such applications there is considerable interest in compact, fan-assisted combustion systems capable of operating at the low levels of excess air necessary for maximum condensation. Fully premixed burners, in which all the air for combustion is supplied as primary air, are, in principle, ideally suited for this purpose. This paper considers the basic concept of fully premixed combustion, its potential advantages and problems, and outlines the results of a systematic design study that was undertaken to optimize the performance of a fully premixed burner of ribbon construction. The conclusions are presented as a set of design guidelines and areas for future activity are identified.

10102 **High efficiency space heating systems utilizing heat-pipe heat exchangers.** Becker, F.E.; Searight, E.F.; Zakak, A.I. pp 695-702 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A high efficiency residential, gas-fired warm-air furnace and a commercial-industrial unit heater utilizing heat-pipe heat exchangers and power combustion burners have been developed. The residential furnace is rated at 29 kW (100,000 Btu/h) and the unit heater at 59 kW (200,000 Btu/h) thermal input. Both have a steady-state efficiency of 85 percent with low NO/sub x/ and CO emissions. Prototype units have been installed at selected field test sites and have undergone accelerated life-cycle testing in the laboratory. The units have completely met the original design specifications and have been found to be reliable in operation.

10103 **Low temperature central heating.** Colonna, A. pp 703-715 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Besides the improvement of practical efficiencies, low temperature central heating shows better results from the comfort point of view than traditional heating systems. Furthermore it allows better recovery of solar gains. Two techniques of emission are available: conventional radiators properly sized and under floor heaters for all of the heating requirements. The results of tests carried out with these two techniques respectively in the test houses and in the climatic engineering laboratory of the Direction des Etudes et Techniques Nouvelles du Gaz de France are given.

10104 **Operating performances of two heating systems including condensing boilers or recuperators.** Pelloux-Prayer, D. pp 716-724 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

After continuous operating of two heating systems including high-performance generators, the overall efficiencies of these new devices have been determined: 84% (relative to gross calorific value) with conventional boilers equipped with recuperators for the flue gas sensible heat, 88% with condensing-boilers for low temperature fire heating. Some conditions are required for these performances, very similar to that obtained in the laboratory, to be reached.

10105 **Analysis of advanced desiccant cooling systems.** Davidson, K.G. (Gas Research Inst., Chicago, IL); Kosar, D.R.; Epstein, M.; Grolmes, M.A. pp 726-740 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

An analysis of an advanced desiccant system that employs a mixed inert and desiccant material adsorption bed was carried out in order to assess its cooling performance response to changes in external process conditions and desiccant characteristics. The results yield upper bounds for the system performance which fully account for the physics of the adsorption process within the bed. The predictions show that coefficients of performance (COPs) approaching 2.0 can be achieved with a mixed-adsorption-bed system operating in a ventilation mode.

10106 **Energy conservation aspects of cooking appliances.** Flood, J.J.F.; Enga, T.G. pp 741-754 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The amount of energy used for cooking food is usually quite small compared with that required for heating and other purposes. Nevertheless, any savings which can be made in fuel consumption are substantial on a national scale and are expected to become relatively more important in modern, low-energy buildings. British Gas has carried out a number of separate studies in both domestic cooking and commercial catering appliances in order to identify means of reducing energy consumption without detriment to appliance performance. The operation of all parts of the cooker, the hotplate, oven and grill, has been investigated, and it is concluded that in many cases savings of 15% to 20% or more can be achieved, amounting, in Britain, to at least 1% of total gas sales.

10107 **Customer preference and response to the indoor environment with gas space heating systems.** Nevrala, D.J.; Pimbert, S.L.; Fishman, D.S. pp 755-767 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Changes in house design and the development of new space heating systems require a reassessment of design assumptions. Original research initiated by British Gas to provide the necessary guidelines is reported. Field results have shown that to maintain high levels of satisfaction, temperatures of up to 24°C are required in living spaces. Unheated bedrooms, even in well insulated dwellings are unacceptable. Occupants are sensitive to room air movement and undesirable patterns cause dissatisfaction. On the basis of field and test chamber results, a method of predicting the percentage of dissatisfied users due to low level draughts has been developed, spacifically for the assessment of novel space heating systems.

10108 **Simulation of the thermal behaviour of buildings by computer.** Sharman, J.R.G. pp 777-785 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The computer program THERM simulates the thermal behavior of buildings. It provides predictions of heating or cooling loads and temperatures throughout a building taking account of the thermal properties of the building and the transient nature of the external environment and building use. The mathematical model on which the program is based describes the transient heat transfer processes that take place both inside and outside the building. These include convection, long-wave radiation exchange between internal surfaces, external long-wave radiation exchange, solar radi-

ation gains, adventitious gains from people, lighting and machinery, ventilation, heat exchange between different building zones, conduction through the building fabric and the thermal capacity of the building. The external environment of the building is represented using hourly weather data measured at a local meteorological station. At each time step the model performs a heat balance on each zone of the building and predicts either the air temperatures or the heating or cooling loads. THERM also predicts humidities and surface temperatures and it can be used to assess the likelihood of condensation.

10109 **Theoretical and experimental techniques for ventilation research in buildings.** Etheridge, D.; Gale, R. pp 786-798 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Ventilation is important to the utilization of gas for a variety of reasons and this importance has been increased in recent years by the desire for energy conservation. As part of its research program British Gas has developed new theoretical and experimental techniques to investigate the ventilation of buildings. A mathematical model, a system for monitoring ventilation rates and a method for measuring leakage distribution are described. Examples of results are presented to illustrate the application of the techniques.

10110 **Design and development of a condensing commercial water heater.** Vasilakis, A.D.; Gerstmann, J.; Demetri, E.P. pp 800-813 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The development of a high-efficiency water heater for commercial applications is described. The water heater operates in the condensing mode during most of its duty cycle, resulting in a steady-state water heating efficiency of 95% and a recovery efficiency typically above 90%. The development unit has an input of 59 kW (200,000 Btu/h) and uses a powered natural gas burner which operates as a sealed combustion system. In addition to high efficiency, the water heater has demonstrated low NO/sub x/ and CO emissions. The design of the water heater is described along with the predicted and measured efficiency results. The unique problems encountered in designing a storage system for use with a condensing water heater are discussed as well as the solutions to these problems. Finally, the performance of the condensing water heater is compared with conventional units currently being marketed.

10111 **Development of pulse combustion water heaters.** Kolodgy, R.J.; Johnson, O.D. pp 814-824 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

American Gas Association Laboratories, under the sponsorship of the Gas Research Institute has developed a prototype 115 liter (30 US gallon) residential water heater incorporating a pulse combustor. The recovery efficiency goal established for the program was set at a minimum of 85% when tested in accordance with American National Standards Institute (ANSI) procedures. Test results indicate the feasibility of applying the pulse combustion principle to residential hot water heaters. Tests on this model resulted in a recovery efficiency of 93 percent as compared with the typical 70% of conventional models. Excessive noise, experienced in earlier pulse combustion applications, has proven to be a minor problem and is easily reduced to acceptable levels. An ignition source device has been applied with excellent results. A purge/start blower system and combustion quality sensor have been successfully applied to the ignition source.

10112 **Computer simulation of pulsations in gas fired pulse combustion water heaters and prediction of their exhaust noise for single and dual combustion chamber designs.** Lee, J.H.; Soedel, W. (Purdue Univ., West Lafayette, IN). pp 825-834 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A mathematical model and computer simulation of the pressure oscillations in a pulse combustion water heater and of its exhaust noise are presented. Experimental measurements are also included for justification. The goals are to understand how a unit should be designed so that it runs in a stable manner and has an acceptable noise level. Present designs accomplish all this satisfactorily, but in a more empirical way than one would like to see.

10113 **Development of new combustion technology for high performance gas appliances.** Toyonaga, H.; Okabayashi, M.; Manago, A.; Machii, N.; Narukawa, S.; Takeishi, Y. (Osaka Gas Co., Ltd., Japan). pp 859-866 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

New combustion technologies have been developed to improve the performance of gas appliances. The characteristics and applications of pulse combustion burners and surface combustion burners developed by Osaka Gas Co., Ltd. are described. The pulse combustion burner developed is of the nozzle mixing type, and is suited to relatively large output for industrial use, in which noise problems are not a major concern. In this area are commercial immersion heaters. Other applications of pulse combustion to boilers and cooking appliances are now under way. A high intensity surface combustion burner has also been developed and applied to domestic space heaters. The burner secures a higher heating intensity, and is expected to be viable for Stirling engines.

10114 **The applicability of energy models to occupied houses: summer electric use in Davis.** Vine, E.L.; Craig, P.P.; Cramer, J.C.; Dietz, T.M.; Hackett, B.M.; Kowalczyk, D.J.; Levine, M.D. (Energy and Environment Div., Lawrence Berkeley Laboratory, Berekeley, CA). *Energy (Oxford);* **7**: No. 11, 909-925(Nov 1982). Contract AC03-76SF00098.

Total electricity use and cooling loads for a three month cooling season (July-September, 1980) in single-family detached houses in Davis, California, are estimated and compared with measured data. Total electricity use is estimated by predicting cooling loads and appliance electricity use using a technique approximating a relatively low cost audit program. Cooling loads are estimated using an interpolation model to simplify application of the DOE-2.1A energy use computer model. Appliance electricity use is derived from manufacturers' data, and patterns of appliance use are elicited from occupants through a survey. While reasonably accurate prediction of aggregate electricity use and cooling load for a group of houses is possible, similar accuracy for individual houses is more difficult because of variation and uncertainty in occupant behavior patterns and building parameters. Precise forecasting of individual house electricity use is unlikely, even when there are no changes in occupancy, unless impracticably expensive monitoring techniques are employed.

10115 **Commercial energy conservation and electrical load management case study.** Noble, J.M.; Cook, B.H.; Holstein, M.P. (Public Service Company of New Mexico, Albuquerque). *Proceedings of the American Power Conference;* **44**: 655-659(May 1982). (CONF-820465—).

From 44. annual meeting of the American Power Conference; Chicago, IL, USA (26 Apr 1982).

Given the high costs of energy today relative to the past, it still remains possible to operate an all-electric, energy-conserving building at a relatively low total energy cost. The UNM ME Building cost is $0.75 per square foot, compared with typical costs ranging from $1 to $2 per square foot. However, as buildings become more energy efficient, it becomes increasingly difficult to justify the

use of renewable energy sources and load management options. The economic analysis indicated that the investment in TES is the only additional HVAC equipment in the UNM ME Building that is cost effective to all concerned parties, and only if the customer's WACC is less than 14.1 percent. The solar options examined are too expensive to justify their installation in a building as energy efficient as the UNM ME Building.

10116 **Comparison of field performance to steady state performance for two dealer-installed air-to-air heat pumps.** Baxter, V.D.; Abbatiello, L.A.; Minturn, R.E. (Oak Ridge National Laboratory, Oak Ridge, TN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 941-953(1982). Contract W-7405-ENG-26.

Two dealer-supplied and -installed, commercially available air-to-air heat pumps were tested under both steady state and long-term field conditions at a site near Knoxville, TN. Results from these tests indicate that in the Knoxville area, during the heating season, losses caused by duty cycling, frosting, and defrosting may exceed 40% in some spring months and cause seasonal efficiencies to fall about 20% below the efficiency of steady state performance. Another approximately 5% decrease in efficiency results from resort to backup resistance heaters at low ambient temperatures. In the cooling mode, cycling losses reduce efficiency by about 10 to 20%.

10117 **Adiabatic absorption and desorption for improvement of temperature-boosting absorption heat pumps.** Grossman, G. (Oak Ridge National Laboratory, Oak Ridge, TN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **8**: No. 2, 359-367(1982). Contract W-7405-ENG-26.

This paper is concerned with an improvement in the conventional absorption heat pump cycle that allows for achieving an increased temperature boost and a better coefficient of performance (COP). The improvement is obtained by adding adiabatic absorption and desorption steps to the absorber and desorber of the system, respectively. The adiabatic processes make it possible to obtain the highest possible temperature in the absorber before any heat is removed from it and the lowest temperature in the desorber before heat is added to it. This, in turn, allows for efficient utilization of the thermodynamic availability of the heat supply stream. Compared to the conventional cycle, the improved system can operate with a larger difference between the high and low concentrations, less circulation losses, and a more efficient heat exchange. The concept of adiabatic absorption and desorption is described and compared for the conventional and improved cycles. Mathematical expressions are derived for the conditions at the adiabatic points, and design considerations are described for incorporating the improvements in a conventional system. Computer-generated performance curves of COP versus temperature boost are given for the heat pump to illustrate the performance enhancement by the adiabatic process.

10118 **Short-Tube refrigerant flow restrictors.** Mei, V.C. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 157-169(1982). Contract W-7405-ENG-26.

Five short-tube refrigerant expansion devices, with L/D ratios from 7.5 to 11.9, were tested on a three-ton split-system heat pump. The test results show that first-stage choking has occurred at the liquid subcooling temperature of 22.2 C° (40.0 F°). However, there is no indication that second-stage choking has ever occurred.

10119 **Field testing energy-saving hermetic compressors in residential refrigerators.** Sauber, R.S.; Middleton, M.G. (Kelvinator Compressor Company, Grand Rapids, MI). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 1074-1083(1982). Contract W-7405-ENG-26.

The design of an energy-saving compressor for low back pressure applications is reviewed. Calorimeter performance results are stated for two sizes of the efficient design and compared with performance test results for a standard compressor. Power consumption of a refrigerator-freezer is given with a standard compressor and with the energy-saving compressor. The preparation of the refrigerators used in the field test is discussed, along with the criteria used in selecting the instrumentation for the project. Results of the energy-saving compressor in the field test, along with a comparison to a standard production compressor, are presented. Some conclusions are drawn, based on the data, in relation to important factors in residential refrigerator power consumption.

10120 **Field test of a high efficiency, automatic defrost refrigerator-freezer.** Topping, R.F.; Vineyard, E.A. (Arthur D. Little, Inc., Cambridge, MA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 1064-1073(1982). Contract W-7405-ENG-26.

This paper describes the market evaluation and field test portion of a program to design, develop, and demonstrate a high efficiency, automatic defrosting refrigerator-freezer for the residential market. After the successful completion of Phase I of the program, which concentrated on the design, construction, and laboratory testing of a 453 l (16 ft^3) high-efficiency refrigerator-freezer prototype, Phase II was initiated in February 1979 to evaluate the sales potential and performance of the high-efficiency refrigerator concept under field conditions, as a necessary step in creating a product that was both manufacturable and marketable. In Phase I, a survey of food consumption and storage trends, family size, and consumer buying habits led to a sales-weighted average-capacity forecast for 1985 of approximately 453 l (16 ft^3) and identification of the top-mount, automatic defrosting refrigerator as the projected sales leader. To meet this market demand, a 453 l (16 ft^3) top-mount was selected as the baseline for the Phase I design and development. In Phase II, a 509 l (18 ft^3) unit using Phase I technology was chosen for the field test, since the slightly larger model better fit the participating manufacturer's new product development efforts and market.

10121 **An optimized two-capacity advanced electric heat pump.** Veyo, S.E. (Westinghouse R & D Center, Pittsburgh, PA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 988-1004(1982).

A two-capacity residential electric heat pump, utilizing a unique dual-stroke compressor, has been developed, designed, constructed in preprototype form, and laboratory tested. The estimated annual energy-efficiency of this system is 20 percent better than the presently availble twospeed electric heat pump. A computer-based constrained optimization procedure was used to select heat exchanger proportions, airflow rates, and compressor stroke ratio in order to minimize the annual ownership cost subject to comfort constraints upon delivered air temperature and dehumidification. A high-efficiency dual-stroke compressor, indoor blower and outdoor fan, plus a microprocessor-based control system were specifically developed for this system. This paper highlights the hardware development and summarizes system and component performance.

10122 **Trends of residential air-conditioning cyclic tests.** Nguyen, H.V.; Goldschmidt, V.W.; Thomas, S.B.; Tree, D.R. (R.W. Herrick Laboratories, School of Mechanical Engineering, Purdue University, West Lafayette, IN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 954-972(1982).

Analyses of trends of cyclic data are performed as part of an evaluation of the DOE test procedure for residential air conditioners. Expected relationships are obtained between the seasonal energy efficiency ratio (SEER) and steady state energy efficiency ratios. An error analysis is done to determine the sources of error in the test procedure. Data for the temperature drop across the evaporator are used to obtain the transient parameters of an air conditioner.

10123 **Development of equipment seasonal performance models for simplified energy analysis methods.** Kusuda, T.; Alereza, T.; Hovander, L. (Center for Building Technology, National Bureau of Standards, Washington, DC). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 249-262(1982).

In pursuit of development of simplified energy calculation methodologies, seasonal performance models for residential heating and cooling systems were developed. Previous studies have shown that the variable-base degree-day (VBDD) method renders results close to those generated by hourly models, such as DOE-2. However, the results included only heating and cooling loads, not energy use. The objective of this research was to develop a method for calculation of seasonal performance of residential HVAC equipment, which could be used within the framework of the variable-base degree-day method. Using the results of DOE-2 on 60 residences representing 10 climatological conditions, seasonal performance models were developed for gas and oil furnaces, heat pumps (heating mode), and air conditioners. These models utilize the heating and cooling loads calculated by VBDD, equipment specifications, and weather information to calculate the seasonal efficiencies for residential HVAC equipment. Results obtained using these seasonal models were mainly within five percent of those calculated hourly by DOE-2.

10124 **Design and laboratory testing of an unequal parallel multicompressor supermarket refrigeration system.** Toscano, W.M.; Cooper, W.L.; Oven, M.J.; Vineyard, E.A.; Walker, D.H. (Foster-Miller, Inc., Waltham, MA). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: No. 2, 1084-1102(1982). Contract W-7405-ENG-26.

The Supermarket Refrigeration Systems Project was structured to investigate and develop new highly energy-efficient supermarket refrigeration systems. A supermarket refrigeration system that included unequal parallel compressors, a condenser with floating head-pressure control, and a microprocessor-based electronic control system was analyzed, designed, and tested. The total system capacity is 35 hp (26.10 kW), consisting of three compressors of 5, 10, and 20 hp (3.73, 7.46, and 14.91 kW), which were determined to be the optimum number and capacity distribution. A theoretical comparison to conventional supermarket refrigeration systems revealed that the three unequal parallel compressor system with R-12 exhibited a maximum annual energy savings of 29,100 kWh, or 26 percent and with R-502 exhibited a maximum annual energy savings of 20,100 kWh, or 15 percent. A compressor capacity control algorithm was designed to select the optimum compressor combination for each operating condition by matching compressor capacity to refrigeration load. A microprocessor system was selected for system control and data acquisition. The economic analysis revealed that for a payback period of three years or less, an added microprocessor-based electronic control system that costs between $500 and $1500, depending on the refrigerant used and the refrigeration load, is acceptable. Testing was performed on the unequal parallel compressor system over a refrigeration load range of 78,000 to 160,000 Btu/hr (22.86 to 46.88 kW). For refrigerant R-12, the increase in the energy efficiency ratio (EER) for the microprocessor-based electronic control system, as compared to the mechanical pressure control system, ranged from 9.8 to 14.4 percent.

10125 **(DOE/RG/08084—T2-Vol.2-Pt.2) North Carolina rate demonstration project. Carolina Power and Light Company study. Project library Part 2. Volume 2.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Jul 1980. Contract FC01-77RG08084. 593p. NTIS, PC A25/MF A01. Order Number DE84004186.

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This volume contains the following exhibits: maximum daily system load on the CP and L system; sample means and coefficients of variation; summary ANOVA comparisons, all customers; summary ANOVA comparisons, high- and low-usage customers, August 1978; estimated ANCOVA models using household data; F-test of restricted models that group TOU rates T01-T09; clarification of real time represented by a billing month; estimated ANCOVA models using prior usage; own- and cross-price elasticity estimates for loglinear Model A; and extension of comparative analysis estimation methodology to response surface applications.

10126 **(DOE/RG/08084—T2-Vol.2-Pt.3) North Carolina rate demonstration project. Carolina Power and Light Company study. Project library Part 3. Volume 2.** (Research Triangle Inst., Research Triangle Park, NC (USA)). Jul 1980. Contract FC01-77RG08084. 233p. NTIS, PC A11/MF A01. Order Number DE84004184.

This volume contains the following exhibits: the modelling of the time-of-day demand for electricity;preliminary analysis of CP and L time-of-use electricity rate effects: February 1978 data; and summary of responses to the commercial and industrial questionnaires.

3202 Transportation

REFER ALSO TO CITATION(S) 9976, 10176, 10196

10127 **(AD-A—132982/0) Powerplant selection for conceptual helicopter design. Master's thesis.** Casey, T.J. (Naval Postgraduate School, Monterey, CA (USA)). Jun 1983. 127p. NTIS, PC A07/MF A01.

A method of optimizing the selection of a power plant based upon engine and fuel weight is developed for use in a conceptual helicopter design course. Historical data is analyzed to verify and modify existing formulae used to estimate engine performance and engine installation weight. Computational programs for use on a hand-held computer and the IBM 3033 are developed to predict analytically engine fuel flow characteristics and to optimize engine selection.

10128 **(DOE/CS/50123—T1) Identification of optimized techniques for operating motor vehicles. Final report, September 1980-September 1981.** Hull, R.W.; Williams, R.K. (Southwest Research Inst., San Antonio, TX (USA)). Sep 1981. Contract AC01-80CS50123. 70p. NTIS, PC A04/MF A01. Order Number DE84002242.

This program was performed to provide new and verified information regarding the operation of motor vehicles to improve fuel economy. The study was directed toward driver operating techniques which could be shown to be applicable to the majority of vehicles in service through the 1985 model year. Data were developed that could readily be disseminated into driver training programs. Because of the limitation in data collection from normal driving conditions, much of this study was conducted using simulated driving situations while operating the vehicles on a chassis dynamometer. Tests involving air conditioning and tire pressures were run on selected roadways where numerous replications could be run for each test parameter. Numerous operating techniques were of interest. Acceleration and deceleration rates, steady speed driving, anticipation of traffic events, effect of cold starts, high and low tire pressures, and the use of air conditioning are items which come within the operators control and were shown to have an influence on fuel economy.

10129 **(DOE/CS/50123—T1(Exec.Summ.)) Identification of optimized techniques for operating motor vehicles. Executive summary.** Hull, R.W.; Williams, R.K. (Southwest Research Inst., San Antonio, TX (USA)). Sep 1981. Contract AC01-80CS50123. 16p. NTIS, PC A02/MF A01. Order Number DE84002120.

This program was performed to provide new and verified information regarding the operation of motor vehicles to improve fuel economy. The study was directed toward driver operating techniques which could be shown to be applicable to the majority of vehicles in service through the 1985 model year. Data were developed that could readily be disseminated into driver training programs. Because of the limitations in data collection from normal driving conditions, much of this study was conducted using simulated driving situations while operating the vehicles on a chassis dynamometer. Tests involving air conditioning and tire pressures were run on selected roadways where numerous replications could be run for each test parameter. Numerous operating techniques were of interest. Acceleration and deceleration rates, steady speed driving, anticipation of traffic events, effect of cold starts, high and low tire pressures, and the use of air conditioning are items which

come within the operators control and were shown to have an influence on fuel economy.

10130 **(DOE/NASA/0295—1) Assessment of institutional barriers to the use of natural gas in automotive vehicle fleets.** Jablonski, J.; Lent, L.; Lawrence, M.; White, L. (Faucett (Jack) Associates, Inc., Chevy Chase, MD (USA); Safety Sciences, Inc., Washington, DC (USA)). Aug 1983. Contract AI01-81CS50006. 89p. (NASA/CR—168183; JACK-FAU—83-302). NTIS, PC A05/MF A01. Order Number DE84005013.

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Institutional barriers to the use of natural gas as a fuel for motor vehicle fleets were identified and assessed. Recommendations for barrier removal were then developed. The research technique was a combination of literature review and interviews of knowledgeable persons in government and industry, including fleet operators and marketers of natural gas vehicles and systems. Eight types of institutional barriers were identified and assessed. The most important were two safety-related barriers: (1) lack of a national standard for the safety design and certification of natural gas vehicles and refueling stations; and (2) excessively conservative or misapplied state and local regulations, including bridge and tunnel restrictions, restrictions on types of vehicles that may be fueled by natural gas, zoning regulations that prohibit operation of refueling stations, parking restrictions, application of LPG standards to LNG vehicles, and unintentionally unsafe vehicle or refueling station requirements. Other barriers addressed include: (3) need for clarification of EPA's tampering enforcement policy; (4) the US hydrocarbon standard; (5) uncertainty concerning state utility commission jurisdiction; (6) sale-for-resale prohibitions imposed by natural gas utility companies or state utility commissions; (7) uncertainty of the effects of conversions to natural gas on vehicle manufacturers warranties; and (8) need for a natural gas to gasoline-equivalent-units conversion factor for use in calculation of state road use taxes. Insurance on natural gas vehicles, and state emissions and anti-tampering regulations were also investigated as part of the research but were not found to be barriers.

10131 **(DOE/NASA/0301—1) Catalog of selected heavy duty transport energy management models, December 1982-November 1983.** Colello, R.G.; Boghani, A.B.; Gardella, N.C.; Gott, P.G.; Lee, W.D.; Pollak, E.G.; Teagan, W.P.; Thomas, R.G.; Snyder, C.M.; Wilson, R.P. Jr. (Little (Arthur D.), Inc., Cambridge, MA (USA)). Nov 1983. Contract AI01-80CS50194. 377p. (NASA-CR—168299). NTIS, PC A17/MF A01. Order Number DE84005402.

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This document is a catalog of energy management models for heavy duty transport systems powered by diesel engines. The catalog results from a literature survey, supplemented by telephone interviews and mailed questionnaires to discover the major computer models currently used in the transportation industry in the following categories: heavy duty transport systems - highway (vehicle simulation), marine (ship simulation), rail (locomotive simulation), and pipeline (pumping station simulation); and heavy duty diesel engines - models that match the intake/exhaust system to the engine, fuel efficiency, emissions, combustion chamber shape, fuel injection system, heat transfer, intake/exhaust system, operating performance, and waste heat utilization devices (turbocharger and bottoming cycle).

3203 Industry And Agriculture

REFER ALSO TO CITATION(S) 9311, 9385, 9540, 9975, 10016, 10072, 10077, 10079, 10102, 10110, 10113, 10168, 10169, 10176, 10409, 10419, 10467

10132 **(ANL-CT—80-3-Add.4) DOE/ANL/HTRI heat exchanger tube vibration data bank (Addendum 4).** Halle, H.; Chenoweth, J.M.; Wambsganss, M.W. (Argonne National Lab., IL (USA)). Dec 1983. Contract W-31-109-ENG-38. 33p. NTIS, PC A03/MF A01. Order Number DE84005441.

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This fourth addendum to the DOE/ANL/HTRI Heat Exchanger Tube Vibration Data Bank presents 6 new case histories of field experiences. The data bank was established in 1980 to accumulate comprehensive case histories on heat exchangers that have experienced tube-vibration problems and on units that have been trouble-free, and to render this information available for evaluation, improvement, and development of vibration-prediction methods and design guidelines.

10133 **(CONF-811108—25) Use of fixed-film, anaerobic bioreactors for energy-conserving treatment of meatpacking wastewaters.** Dinsmore, T.V. (Oak Ridge National Lab., TN (USA)). Nov 1981. Contract W-7405-ENG-26. 20p. NTIS, PC A02/MF A01. Order Number DE84004390.

From Annual meeting of the American Institute of Chemical Engineers; New Orleans, LA, USA (8 Nov 1981).

A new wastewater treatment process based on the anaerobic approach has been developed at Oak Ridge National Laboratory. This treatment process is based on a packed-bed reactor to which anaerobic microorganisms have been added. An attempt was made to determine experimentally if waste waters from a meatpacking plant could be treated in a laboratory-scale ANFLOW (anaerobic upflow) bioreactor. This included evaluating a packing material for use in the bioreactor, demonstrating the development of fixed films in the bioreactors, and determining the times required for system start-up. The performance of the bioreactor in removing carbon from the waste waters and in producing methane as a by-product is evaluated. (MHR)

10134 **(CONF-8310238—1) Recovery of metals from waste streams.** Kremer, F. (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 15p. NTIS, PC A02/MF A01. Order Number DE84003605.

From Illinois hazardous waste task force joint meeting of the committee on alternate technologies and economics committee; Rockford, IL, USA (25 Oct 1983).

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Four commercial metal recovery technologies are described: reverse osmosis, ion exchange, electrolytic treatment, and electrodialysis. First the technology is described briefly and then a case is given for its utilization. (MHR)

10135 **(DOE/CS/15003—T1) Method of burning residual fuel oil in distillate fuel oil burners. Summary report.** (Bernhard Engineering, St. Louis, MO (USA)). 19 Nov 1982. Contract FG01-80CS15003. 5p. NTIS, PC A02/MF A01. Order Number DE84002125.

Design and construction of combustion chambers and auxiliary equipment are discussed. Experience with 12 different models of dual fuel low pressure air atomizing type sealed burners with refractory tiles is described.

10136 **(DOE/CS/15016—T1) Stirred Heat Exchanger (SHE) systems. Final report.** (Bailey Energy Systems, Inc., Haskell, NJ (USA)). 18 Dec 1981. Contract FG01-80CS15016. 36p. NTIS, PC A03/MF A01. Order Number DE84002132.

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A general objective of this project was to design, evaluate, and commercialize internally- and externally-stirred heat exchangers systems, particularly in applications involving energy recovery from dirty and condensing combustion products. The manufacturing and test facility was totally destroyed by fire within approximately 8 weeks of the initial contract period, along with all SHE prototypes, instrumentation, and special equipment. An externally-stirred heat exchanger was developed which incorporates certain practical features and satisfies the objectives of the project. A detailed description of this SHE is presented and its technical features in different product applications are reviewed. (MHR)

10137 **(DOE/CS/40047—1) Technology for improved energy utilization in metal heat-treating operations.** (Institute of Gas Technology, Chicago, IL (USA)). [nd]. Contract AC02-77CS40047. 68p. NTIS, PC A04/MF A01. Order Number DE84003013.

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A plant was selected to evaluate five pieces of equipment, one or more of which may be found in the total complement of

heat treat equipment in an average heat treat operation. The equipment for this study was selected in cooperation with the Metal Treating Institute. The data for this study were collected in a heat-treating plant. The furnaces studied in this report are the following: a shaker hearth furnace used for hardening and light case carburizing of small steel parts; an open-fired box furnace employed in pack carburizing and in heat treating large parts; an integral quench furnace utilized in hardening, carburizing, nitriding and carbonitriding small to medium-sized steel parts; a recirculating pit furnace used for tempering and annealing a variety of different sized parts; and an integral quench furnace for hardening, carburizing, and carbonitriding medium to large parts.

10138 **(DOE/CS/40075—T1) Preservation of fresh solid foods by gas exchange. Final report of Phase I.** (Maryland Univ., College Park (USA)). 30 Sep 1980. Contract AS01-77CS40075. 66p. NTIS, PC A04/MF A01. Order Number DE84004392.

GASPAK is a new system for preserving fresh, solid foods through gas-exchange methods. Its objective is to stabilize or at least significantly extend like-fresh, high-quality shelf-life at ambient and/or chilled temperatures. This is a brief, comprehensive final report of Phase I of a projected three-phase GASPAK project carried out by the University of Maryland. Work to date indicates that through gas exchange procedures the like-fresh quality of peeled and sliced apples and potatoes can be maintained for extended periods. This was determined through gas exchange processing in a device engineered specifically for the purpose and by laboratory tests. From an energy consumption standpoint, it was determined that for more acid (less than ph 4.6) foods at least, the energy cost for the process itself is about one-fourth that required for canning or freezing. It was also determined that total energy costs from harvest to the consumer are approximately half those for canning or freezing.

10139 **(DOE/CS/40321—T1) Energy savings by recovered materials use in the copper industry .** (Policy Planning and Evaluation, Inc., McLean, VA (USA)). May 1981. Contract AC01-80CS40321. 41p. NTIS, PC A03/MF A01. Order Number DE84004772.

An overview of the copper industry is presented including industry structure and copper production statistics. Copper recovery is discussed: first describing the process of primary copper production and then copper recovery from scrap. Energy savings due to recycling are covered. (MHR)

10140 **(DOE/ID/12423—T1) Temperature-resistant elements for reverse osmosis treatment of hot process waste. Final report.** Peterson, R.J.; Thorpe, J.N.; Cadotte, J.E.; Koo, J.Y. (FilmTec, Minneapolis, MN (USA)). Dec 1983. Contract FC07-82ID12423. 75p. NTIS, PC A04/MF A01. Order Number DE84005190.

An experimental program was conducted studying the mechanisms of performance loss in reverse osmosis elements operated at combinations of high temperature (60 to 85°C) and pressure (200 to 800 psig). The FilmTec FT-30 thin-film-composite membrane was used in these studies. Compaction of the aromatic polyambide barrier layer in the FT-30 membrane was identified as one cause of permeate flux loss above a threshold temperature of 50°C. This flux loss could not be eliminated through membrane modification experiments. However, fluxes at 60 to 85°C were still economically attractive, because the degree of flux loss was almost fully offset by increased permeate flux as a function of increased temperature. Spiral wound membrane elements showed severe performance loses during short and intermediate term studies at high temperature and pressure. Compaction and collapse of the permeate channel materials were the primary reason. These materials consist of multifilament Dacron fabrics stiffened by a post-treatment with melamine-formaldehydr or epoxy resin. The melamine resin hydrolyzed in 40 hours at 80 to 85°C, and the epoxy resin lost its stiffness above 50°C. A need was identified for novel permeate channel fabrics that resist compaction at 85°C and 800 psig. Experimental elements made with an expensive woven metal screen demonstrated useful permeate fluxes (15 to 17 gallons per square foot of membrane per day) after 165 hours of exposure to 15 percent sucrose solution at 80 to 85°C and 800 psig.

10141 **(NBS-SP—542) Possible contributions of cement and concrete technology to energy conservation.** Frohnsdorff, G.; Brown, P.W.; Clifton, J.R. (eds.). (National Engineering Lab. (NBS), Washington, DC (USA)). May 1979. Contract AT01-77CS40119. 79p. NTIS, PC A05/MF A01. Order Number DE84005445.

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The purpose of the workshop was to identify and record ideas on possible contributions of cement and concrete technology to energy conservation in the near term and by the year 2000. This included consideration of current technology as well as areas in which technological advances might be realized. The workshop was divided into working groups on cement composition, cement production, blending materials, concrete production, efficient use of concrete, and institutional factors. The essential results from the six working groups were statements of Energy-Saving Opportunities, Research Needs, and Unresolved Issues. The statements, which are the major part of this report, are presented without critical analysis.

10142 **(NBSIR—76-1008) Energy conservation through the facilitation of increased blended cement use.** Brown, P.W.; Clifton, J.R.; Frohnsdorff, G. (National Bureau of Standards, Washington, DC (USA). Inst. for Applied Technology). Feb 1976. Contract AT01-77CS40119. 27p. NTIS, PC A03/MF A01. Order Number DE84005448.

About 95% of the cement produced in the United States is portland cement and its manufacture requires about 2% of the energy consumed annually in the nation's industrial processes. The production of blended cements containing substantial amounts of fly ash or blast furnace slag and their substitution for portland cement appears attractive from the standpoint of energy conservation. While production and utilization of blended cements in other industrialized countries is extensive, blended cements account for less than 1% of the total cement production in the U.S. The reasons for the small U.S. production of blended cements are discussed in the contexts of standards revision and the need for the development of additional data as a basis for this revision.

10143 **(NBSIR—81-2273) Factors affecting the soundness of blended cements.** Brown, P.W.; Clifton, J.R. (National Bureau of Standards, Washington, DC (USA)). Jun 1981. Contract AT01-77CS40119. 25p. NTIS, PC A02/MF A01. Order Number DE84005444.

Portions are illegible in microfiche products.

Blended cements containing fly ash and blast furnace slag along with admixed periclase were examined using autoclave curing as specified by ASTM C151 and long-term immersion curing to assess their expansions as a function of the curing conditions. In some instances, measurements of linear expansion were combined with compressive strength measurements. The partial replacement of portland cement by fly ash while maintaining a fixed periclase content was found to significantly reduce expansion as measured by ASTM C151. Partial replacement by fly ash was also found to reduce the expansions which occurred as a result of long-term immersion curing. However, significantly larger expansions were observed in the latter case.

10144 **(NZERDC—94) Energy conservation and oil substitution at a dairy company.** (New Zealand Energy Research and Development Committee, Auckland). Oct 1983. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84900599.

Energy consumption data at the Bay of Islands Co-Operative Dairy Company for the 1980-1981 season were collected and analyzed according to energy demand and supply. Although oil consumption had been significantly reduced in the last few years, it was still a disproportionately large item in the energy budget. Given the existing coal handling facilities it seemed feasible to completely eliminate the need for oil except as a standby fuel. The study examined various options and three measures were proposed to achieve this goal. These were: (1) addition of two effects to the main evaporator, (2) replacement of the oil-fired spray drying air heater with steam coils, and (3) installation of coal-fired low pressure hot water boilers and associated pipework.

10145 **(PB—83-242115) Reduction in metal consumption by the use of alternating lines of higher and lower lifter bars in a rod mill.** Howat, D.D. (Council for Mineral Technology, Randburg (South Africa)). 28 Apr 1983. 21p. NTIS, PC E03/MF E01.

A change was made in the arrangement of lifter bars in the no. 2 rod mill (9 ft by 12 ft) at the Kloof Mine. During complete relining the year before, the mill was fitted with alternating lines of lifter bars 105 and 75 mm in height. One test line of 105 mm plain carbon-steel bars, hardened and tempered, was fitted in the mill at that time to permit comparison of the wear resistance with that of the manganese-steel bars normally used. The results obtained showed a substantial saving in the consumption of liner metal: 370,000t of ore were milled before the lifter bars needed to be replaced–an increase of 34 per cent. Only one half of the lines of lifter bars was replaced, 105 mm bars being fitted into the lines formerly occupied by 75 mm bars. The fineness of grind to the product was not affected adversely, and the consumption of power per ton of ore fed to the mill was marginally lower.

10146 **(PB—83-259929) Battery-related wastes in the UK (United Kingdom) and their disposal.** Tron, A.R. (Warren Spring Lab., Stevenage (UK)). [nd]. 40p. NTIS, PC AE04/MF E04.

The lead, nickel, cadmium, mercury, silver and zinc contents of spent batteries, together with those of battery manufacturers residues and production rejects over a 12-month period in 1980-81 are estimated. Disposal practices are examined and losses of these metals in uncollected materials and during recycling operations are assessed. The effects of changes in battery technology on recovery operations and practices are discussed and possible R and D needs to maintain efficient recovery and prevent environmental pollution in the future are suggested. Metal consumption by UK battery manufacturers and in batteries by UK end-consumers are estimated in two Appendices. (Copyright (c) Crown Copyright 1982.)

10147 **(PB—83-260182) Need for long term lagoons - a literature survey.** Green, P.V. (Warren Spring Lab., Stevenage (UK)). [nd]. 49p. NTIS, PC AE04/MF E04.

This report has been prepared by Warren Spring Laboratory for the Department of the Environment (DoE) under a repayment contract. The views expressed are those of the author, and not necessarily those of DoE. The report presents a literature survey considering the continuing need for long term tailings lagoons. It contains a review of current practice in the diverse industries producing fine slurry wastes, followed by discussion of the alternative or additional methods of dewatering and stabilizing these products that have been investigated. Marine or underground disposal systems, not employing tailings lagoons, are discussed, and the possibilities of avoiding the tailings disposal problem by putting waste products to positive uses are assessed. Environmental controls and regulations on waste disposal are increasing and summaries of these are presented, together with some examples of their influence. It is concluded that waste lagoons will remain an important means of disposing of tailings slurries, though additional treatments will increasingly be incorporated into conventional settling ponds. (Copyright (c) Crown Copyright 1980.)

10148 **(PB—84-100452) Impact of GRI's (Gas Research Institute) industrial energy efficient programs. Final report Mar 1982-Feb 1983.** Lerner, M.O.; Salama, S.Y. (Energy and Environmental Analysis, Inc., Arlington, VA (USA)). Mar 1983. 24p. NTIS, PC A02/MF A01.

Under its Industrial Utilization program, GRI is funding the development of various technologies that utilize gas more efficiently, compared to existing options, in a wide range of industrial applications. A consistent methodology, developed and demonstrated during last year's efforts, was utilized to project future market penetration and energy impacts of selected technologies covered under the Industrial Utilization program. The projection methodology was also used as a basis for an assessment of the degree of vulnerability of gas use in various industrial markets due to long-term competition from electricity and coal. Use of a consistent and comprehensive methodology is especially important in the industrial sector due to the diversity of processes used and the impact on fuel use patterns of numerous factors such as the introduction of new technologies, different product growth rates, fuel prices, and industrial decision-making behavior. This Final Report summarizes the objectives and results of several technical, economic and market impact analyses undertaken in support of the Industrial Utilization RandD program.

10149 **(PB—84-105071) Residential and commercial cogeneration systems assessment. Final report Mar 1982-Jun 1983.** Bullard, C.W.; Althof, J.A. (Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering). Aug 1983. 98p. NTIS, PC A05/MF A01.

Over a wide range of technical performance charactersitics and thermal load profiles, it appears that cogeneration systems having installed costs in the $500 to $1500/kW range will be economically feasible if they can be sized to take advantage of peak and intermediate electricity values in the range of 6-10 cent/kwhe. These results were obtained assuming a fuel cost of 2 cent /kWht ($6/MMBtu). The optimal size of such systems is often larger than the building's peak thermal load. Moreover, daytime cooling loads can often be met more economically with a cogeneration/absorption cooling system than with vapor compression systems. The presence of absorption cooling improve the feasibility and increases the optimal size of the cogenerator, due to the increased capacity factor. The key to economic feasibility is to achieve a high degree of waste heat recovery and a high electric/thermal ratio in the cogenerator, in order to minimize the incremental operating cost of the system on summer days when cooling loads are high and electricity rates are highest.

10150 **(TVA/PUB—84/15) Comparison of energy requirements for production of high-nitrogen mixed fertilizer by the nitrophosphate route with the urea-ammonium phosphate route.** Blouin, G.M. (National Fertilizer Development Center, Muscle Shoals, AL (USA)). 1983. 51p. (CONF-831063—12). NTIS, PC A04/MF A01. Order Number DE84900622.

From American Institute of Chemical Engineers fall annual meeting; Washington, DC, USA (30 Oct 1983).

Earlier estimates of relative prices of nitrophosphates and urea-ammonium phosphates demonstrated economic advantages for the nitrophosphates. However, inefficient (energy) intermediate processes were postulated then. In the present study, the energy requirements of the two routes are evaluated, using the most energy-efficient-intermediate processes currently available, including cogeneration facilities. Although the nitrophosphate route required about 13% lower total system energy than the urea-ammonium phosphate system, this difference may not be statistically significant. Other factors, such as specific site economics and product acceptability, may override the energy factor. A supplemental and parallel examination of the ammonium nitrate-ammonium phosphate system indicated that such a system would require only one-fourth the energy of two original systems. This result is a strong argument for a rigorous reexamination of the position of ammonium nitrate in the future.

10151 **Innovative industrial materials processes.** Hane, G.; Abarcar, R.; Hauser, S.G.; Williams, T.A. (Pacific Northwest Laboratory). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 5: 2078-2084(Aug 1983). (CONF-830812—). Contract AC06-76RL01830.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This paper reviews innovative industrial materials processes that have the potential for significant improvements in energy use, yet require long-term research to achieve that potential. Potential revolutionary alternatives are reviewed for the following industries: iron and steel; aluminum; petroleum refining; paper and pulp; food and kindred products; stone, clay and glass; textiles; and chemicals. In total, 45 candidate processes were identified. Examples of these processes include direct steelmaking and ore-to-powder systems that potentially require 30% and 40% less energy, respectively, than conventional steelmaking systems; membrane separations and freeze crystallization that offer up to 90% reductions in energy use when compared with distillation; cold processing of cement that offers a 50% reduction in energy requirements; and dry forming of

paper that offers a 25% reduction in the energy needed for papermaking.

10152 Redesigning energy intensive systems for a dual purpose. El-Sayed, V.M. (M.I.T., Cambridge, MA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2085-2091(Aug 1983). (CONF-830812—). Contract AC02-79ER10518.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The sharing of driving energies and processing devices by more than one product can be cost effective. Dual-purpose design concepts for two different systems conventionally single purpose are considered and the problems to be solved are discussed. One system is an industrial metal scrap melter integrated with a power co-producing system. The other is a domestic water heater modified for pure water coproduction. Preliminary analysis shows cost effectiveness over a number of currently occurring boundary conditions.

10153 An overview of research requirements for stationary combustion systems. Chockie, A.D.; Barnhart, J.S.; Scherer, J.B. (Pacific Northwest Laboratory, Richland, Washington). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **5**: 2092-2098(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This paper presents a preliminary assessment of the basic research and development efforts required to ensure the efficient use of alternative fuels such as municipal solid waste (MSW) and wood material in stationary combustion systems. The major focus of the research efforts identified in this paper was the establishment of comprehensive fuel dependent analysis methods to assist in the optimal design and operation of stationary combustion systems using alternative fuels. The research recommendations are based on three sources of information; the review of current combustion design considerations, the examination of the impacts MSW and wood fuels have on efficient system operation, and input from individual involved in basic stationary combustion research activities and/or alternative fuel utilization operations.

10154 Performance test results of an absorption heat pump that uses low-temperature (60°C (140°F)) industrial waste heat. Huntley, W.R. (Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1921-1926(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

An absorption heat pump for upgrading industrial waste heat to process steam temperatures has been developed and successfully tested at Oak Ridge National Laboratory. The heat pump is designed to operate with waste heat temperatures ranging from 60 to 90°C (140 to 194°F). Performance data from the 42-kW (12-ton) prototype heat pump have shown good agreement with theoretical predictions. Advantageously, most of the energy for operation comes from the waste heat, with only low inputs of electrical energy for parasitics; electrical coefficients of performance ranging from 50 to 70 have been demonstrated. The successful operation of this absorption heat pump prototype has demonstrated that this concept is a practical candidate for energy recovery from waste heat in industrial applications where low temperature process steam is needed.

10155 Development of an analytical design technique for condensing flue-gas heat exchangers. Lux, J.J. Jr.; Razgaitis, R.; Ball, D.A.; Locklin, D.W. (Battelle Columbus Labs., OH). pp 656-670 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The economic incentives of energy conservation in recent years have influenced manufacturers and operators of combustion equipment to take a serious interest in the prospect of extracting previously unused latent heat from exhaust flue gas. Accurately designing a heat exchanger to reclaim a large portion of this potentially available energy in the flue gas is complex because of the coupled heat and mass transfer processes present. This paper presents a validated numerical model which can be used to design such a heat exchanger. The geometry presently modeled is restricted to circular tubes in cross-flow with flue gas external. However, the model is capable of accomodating any specified tube size, arrangement, spacing pattern, number of rows, flue gas composition and flow rate, and coolant temperature and flow rate. Analysis of the important heat transfer process in the wet zone is based upon an improved Colburn-Hougen approach, using a specified incremental area to drive the solution methodology.

10156 Development and application of energy-saving O_2 control system with variable voltage frequency inverter (VVVF) for forced draft fan (FDF). Sakurai, K. (Tokyo Gas Co., Ltd., Japan). pp 846-858 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

It is well known that the heat loss from the flue gas is the largest component of other losses in combustion systems. There are two main ways to decrease the flue gas loss: heat recovery from flue gas to preheat the combustion air or the feed water and operation with minimum combustion air to reduce the flue gas volume. A new type of O_2 controller consisting of a zirconia sensor and a thyristor inverter to control the rotation of a Forced Draft Fan has been developed, whic is intended to reduce the fuel as well as the electricity consumption. The benefits of this system are summarized as follows: (1) fuel consumption is decreased. (0.5 to 1.5% in the case of boilers); (2) electricity consumption is decreased (30 to 40%); and (3) the power circuit is directly connected to a commercial electricity line in case of failure in the controller, which makes the system safe and more reliable.

10157 Noise emission from industrial high velocity gas burners. Kremer, H. (Ruhr Universitaet, Bochum, Germany); Otto, D. pp 867-878 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Improvement of furnace performance has been the major reason of installing high velocity gas burners at industrial furnaces. The advantage of these burners is based on their ability to increase convective heat transfer and to get more uniform temperature distributions within the furnace enclosures. Some results of a detailed investigation of the noise emission of high velocity burners is given. A number of physical and chemical factors is involved in determining the actual noise, i.e., spectral distribution of noise pressure emanating from a burner. Most of the tests were performed at an open test rig but also the influence of furnace walls on dampening the intensity of the noise was investigated. Dimensional analysis finally led to a general equation correlating well with the experimental results.

10158 Oxygen-enriched combustion system utilizing membranes. Ito, H. (Osaka Gas Co., Ltd., Japan). pp 879-888 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

It is known that combustion energy can be saved by using air with a high oxygen concentration. So far, however, there has been no method of obtaining oxygen-enriched air easily and economically, and the oxygen-enriched combustion technique was not used practically. A useful method of oxygen-enriched combustion utilizing oxygen selectively passing through membranes was successfully developed. This system is expected to save a lot of energy, especially in high-temperature industrial furnaces, such as rolling and heating, glass melting and ceramic firing, and it is attracting keen attention in various fields.

10159 High-temperature flue gas heat recovery system. Coombs, M.; Strumpf, H.; Kotchick, D.; Vogt, R.; Dobos, C. pp 910-919 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

High levels of recuperation of high-temperature industrial furnaces can offer an economic and effective means for improving process efficiency. The development of a recuperator and burner capable of operating in flue gas temperatures up to 1350°C and providing up to 1100°C combustion air preheat temperature is described. Such a system can offer in excess of 50 percent savings in fuel consumption over an unrecuperated furnace. The system consists of a ceramic recuperator operating in series with a conventional plate-fin metallic recuperator. The ceramic recuperator consists of an array of silicon carbide tubes mounted in a ceramic-lined structure. An air dilution system is employed between the two recuperators to minimize the size of the ceramic recuperator and permit operation over a wide range of turndown ratios. A 5.3 GJ/h prototype recuperator and burner system has been fabricated and is being assembled for laboratory testing.

10160 Mathematical modelling of the thermal performance of furnaces operating under non-steady state conditions. Saimbi, M.S.; Tucker, R.J. pp 920-930 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

A mathematical model is described which simulates the thermal performance of steel reheating furnaces operating under non steady-state conditions. This model, which has been validated against measured performance data is capable of predicting furnace performance from a cold start and can account for interruptions during production. The influence of design and operating parameters on efficiency, and temperature uniformity and metallurgical quality (e.g. scaling) of the heated steel can be studied for furnaces operating under realistic production conditions. Examples are given which illustrate how the model is applied to evaluate energy saving measures. These are a study to define a more efficient start-up procedure for a two zone pusher reheating furnace and the evaluation of improvements to the construction and operation of a batch furnace.

10161 Industrial absorption heat pumps. Turbet, C. pp 932-942 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (In French)(CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Developing energy recovery techniques is a necessity in the present energy situation. Absorption heat pumps are likely to bring very interesting solutions in some industry sectors, particularly at high revalorization temperatures. The results of two design and development studies are presented: a high temperature closed-circuit absorption heat pump; and an open-circuit absorption heat pump, called absorption dryer, in which the heat carrying fluid is constituted by the steam of an industrial dryer condensed into water.

10162 Energy conservation by mechanical vapor recompression. Becker, F.E.; Ruggles, A.E.; Stasenko, D.; Pasquinelli, D.M. pp 943-951 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Thermo Electron has developed an open-cycle vapor compression steam heat pump system that upgrades to usable process pressure levels low-pressure waste steam or that produced from an industrial excess heat source with a waste heat boiler. Recovery and upgrading of these waste heat sources offer a great potential for energy conservation. With this system, fuel consumption can be as low as 30% of that for a direct-fired boiler. A demonstration system designed to compress 1.26 kg/s (10,000 lb/h) of steam has been tested under laboratory conditions for over 650 hours over a wide range of conditions. The system performance has been completely satisfactory. The unit has now been installed in an industrial plant to evaluate its performance and reliability over long duration.

10163 Metal hydride heat pump. Argabright, T.A.; Wade, G.W. (Solar Turbines Inc., San Diego, CA). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 1160-1165(Aug 1982). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Solar Turbines Incorporated and Southern California Gas Company are cooperating in the development and demonstration of a metal hydride heat pump (MHHP). The MHHP is a chemical heat pump containing two different hydrides. The heating or cooling is provided by the heat of formation produced when hydrogen absorbs or desorbs from specific metals. Hydrogen is not consumed. It is a working fluid for the recovery of thermal energy. The MHHP can be tailored to provide heating and/or cooling or temperature upgrading over a wide range of input and ambient temperatures. The system can thus be used with a variety of heat sources including unused heat, solar energy or a fossil fuel. Work on a refrigeration unit and a temperature upgrader unit is reported.

10164 The engineering and manufacture of a high efficiency, automatic defrost refrigerator-freezer. Bohman, R.H.; Harrison, R.L. (Refrigeration Products, Amana Refrigeration, Inc., Amana, Iowa). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 1053-1063(1982). Contract W-7405-ENG-26.

This paper describes the engineering effort and method of manufacture used to build 36 high efficiency, automatic defrosting refrigerator-freezers. This work was undertaken as Phase II of a Department of Energy sponsored project to develop and test market a refrigerator-freezer of the automatic defrosting type that represented the best current capability for energy efficiency. A national laboratory was the prime contractor for the project, with a research firm and a manufacturer serving as subcontractors for the research and development, design engineering, and manufacturing phases of the task. Phase I of this project, optimizing the design and proving it feasible, has previously been reported. Although the prototype model developed was a 16 ft^3 (453 1) refrigerator-freezer, there was agreement by all parties involved in the project that an 18 ft^3 (510 1) model would be better suited for the market test. Early in 1979, the engineering team involved in this project began the design work to produce this model.

10165 Energy choices and capital investment in the food industry. Santini, D.J.; Grogan, P.J.; Hanson, D.A.; Klein, Y.L. (Argonne National Lab., IL). pp 753-756 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

10166 Coal slurries as alternate fuels for oil-designed boilers. Pan, Y.S.; Bellas, G.T.; Snedden, R.B.; Joubert, J.I. (Dept. of Energy, Pittsburgh, PA). pp 34p, Paper 14 of International symposium on conversion to solid fuels. Irvine, CA; Energy and Environmental Research Corporation (1982). (CONF-821060—).

From International symposium on conversion to solid fuels; Newport Beach, CA, USA (26 Oct 1982).

Several combustion test programs have been performed at the Pittsburgh Energy Technology Center (PETC) of the US Department of Energy (DOE) to evaluate alternate fuels in oil-designed boilers. The overall objective is to develop retrofit technology for existing oil-fired boilers to conserve petroleum fuel. The alternate fuels investigated at PETC include coal-liquid mixtures, such as coal-oil, coal-water, and coal-methanol. In this paper, the hardware developed to permit utilization of coal slurries as liquid fuels in oil-designed boilers is described, and selected coal-slurry combustion test results are presented.

3206 Municipalities And Community Systems

REFER ALSO TO CITATION(S) 9543, 9544, 9989, 10041, 10044, 10133

10167 (CONF-8006270—1) Disposal of solid wastes with simultaneous energy recovery. Ghosh, S. (Institute of Gas Technology, Chicago, IL (USA)). 1980. 23p. NTIS, PC A02/MF A01. Order Number DE84900381.

From 1. international symposium of solid wastes; Cucuta, Colombia (24 Jun 1980).

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The need for resource recovery from solid wastes is discussed. The incentives for a comprehensive system, a gasification based disposal system, and biological recovery methods are reviewed. Biogas process development and the Lanfilgas process are described. (MHR)

10168 (DOE/CE/26407—T1) R,D and D needs of DHC technology: summary of R,D and D task recommendations. Gleason, T.C.J. (Self-Reliance, Inc., Washington, DC (USA)). 5 Dec 1983. Contract AC01-82CE26407. 35p. NTIS, PC A03/MF A01. Order Number DE84005158.

The following are discussed: consumer systems, thermal distribution technologies, cogeneration for district heating and cooling (DHC), the use of industrial waste heat in US district heating systems, the use of biomass energy conversion technologies in DHC systems, and solar energy technology for use in DHC systems. (MHR)

10169 (DOE/CE/26407—T2) Research, development and demonstration needs of district heating technology. Final report. Gleason, T.C.J. (Self-Reliance, Inc., Washington, DC (USA)). Nov 1983. Contract AC01-82CE26407. 887p. NTIS, PC A99/MF A01. Order Number DE84005157.

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The following chapters are included: end use technologies for district heating and cooling (DHC); district heating and cooling distribution systems; cogeneration technologies for DHC; industrial waste heat utilization for district heating; biomass fuels for use in cogeneration and heat production for DHC; solar district heating: first generation technologies; R and D needs in solar collector technology for use with interseasonal thermal storage and district heating systems; and the use of heat pumps in low temperatures district heating systems. (MHR)

10170 (DOE/NBM—4005357) Feasibility of implementing a municipal waste-to-energy system to supply Youngstown Thermal with a solid fuel or steam system. (Battelle Columbus Labs., OH (USA)). [nd]. Contract W-7405-ENG-92. 222p. NTIS, PC A10/MF A01. Order Number DE84005357.

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The available municipal solid waste and economics of disposal are discussed. Other topics included are: the description and economics of Youngstown Thermal's existing system, the refuse-derived-fuel technical feasibility, the refuse mass-burning technical feasibility, economic evaluation, and institutional considerations. (MHR)

10171 (EGG-M—22883) Energy from municipal solid waste (EMSW); status of mechanical equipment and systems. Mayberry, J.L. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 25p. (CONF-831151—2). NTIS, PC A02/MF A01. Order Number DE84005054.

From State-of-the-art and emerging technologies: a waste-to-energy workshop; Chicago, IL, USA (28 Nov 1983).

The status of some of the mechanical equipment used to prepare municipal solid wastes (MSW) for energy recovery: the kinds of equipment available and their uses, advantages and disadvantages, and potential problems. Mechanical equipment in MSW processing plants includes unit operations (size reduction equipment, classifiers or separators, and densifiers) and auxiliary equipment (conveyors and storage facilities). Unit operations produce an upgraded or beneficiated fraction from MSW. This fraction is called refuse-derived fuel (RDF) when it is to be burned for energy. In other conversion systems, the beneficiated fraction of MSW is used as a feedstock for a biodegradation or pyrolysis process. This paper covers size reduction equipment and classifiers, but does not cover energy recovery processes that do not usually involve mechanical processing, such as mass burning of MSW or methane recovery from landfills.

10172 Electric utility conservation programs and the decision to abandon partially completed supply projects. Kahn, E. (Energy and Environment Division, Lawrence Berkeley Laboratory, University of California, Berkeley, CA). *Energy (Oxford);* 7: No. 11, 927-943(Nov 1982). Contract AC03-76SF00098.

Electric utility conservation programs are examined in the context of a decision to terminate partially completed supply projects, using the case of Philadelphia Electric Company's Limerick generating station. A cost-effectiveness criterion is developed for such utility programs. Methodology for determining the cost of various loan and grant programs is outlined, and particular programs are evaluated. It is found that utility financial incentives for end-use conservation are usually cost-effective; in the case study, conservation programs could replace one of the two units under construction; except for the lowest cost-programs, conservation competes with continued construction.

3209 Education And Public Relations

10173 (DOE/CS/20423—T2) Energy management and community planning. Final technical narrative report. (American Planning Association, Washington, DC). Aug 1982. Contract FG01-78CS20423. 5p. NTIS, PC A02/MF A01. Order Number DE84004546.

The Energy Management and Community Planning Grant objective has been to establish systematic means of technology transfer and information exchange to incorporate specific considerations of energy management in public planning decisions. The participating audience consists of persons with official responsibilities for city planning and regional planning work. The project was carried out between August 19, 1978 and August 18, 1981. The means used included publications, conferences, workshops, and technical advice. The publications consisted of newsletters prepared for an Energy Planning Division of the Association, magazine articles, proceedings of conferences, and workbooks used in workshops. The conferences and workshops consisted of sessions at each National Planning Conference, specialized workshops held independently of other conferences, and workshops on energy management held by chapters of the Association. The technical advice was given by telephone and letter responses.

10174 (DOE/CS/24402—T1) Model industry initiated energy conservation program. Final report. (Greater Washington Board of Trade, DC (USA)). Mar 1981. Contract FG01-80CS24402. 109p. NTIS, PC A06/MF A01. Order Number DE84005186.

Portions are illegible in microfiche products.

During 1980 and the first months of 1981, the Greater Washington Board of Trade operated a pilot program which successfully promoted energy conservation in five local industries: hotels, retail stores, schools, restaurants and apartments/office buildings. Through a variety of workshops, seminars, newsletters, call-in centers, detailed publications and other methods, the Board of Trade spread the work about energy conservation. This final report summarizes the program's efforts and proposes a model for use by business organizations in other parts of the country which may be interested in energy conservation.

10175 (DOE/CS/69008—T1) DOE/EES non-pilot grant final program report. (Idaho State Office of Energy, Boise (USA)). [nd]. Contract FG01-78CS69008. 3p. NTIS, PC A02/MF A01. Order Number DE84004774.

The activities of the state of Idaho in preparing for its Energy Extension Service are reviewed beginning in June 1978. (MHR)

10176 **(DOE/CS/69017—T1) Wisconsin Energy Extension Service pilot project. Final report, October 1977-March 1980.** (Wisconsin Univ., Madison (USA). Extension). 1980. Contract FG01-77CS69017. 93p. NTIS, PC A05/MF A01. Order Number DE84004217.

Portions are illegible in microfiche products.

After a general program description, accomplishments and appraisal are presented for the following projects: residential audit training, safety and efficiency in woodburning, energy conservation in agricultural transportation, energy conservation for low and moderate income, energy demonstration centers, energy conservation in the hospitality industry and the EES Information Center. The Directors report, special project report, and key evaluation findings are included. (MHR)

10177 **(ORNL—5984) Reaching people with energy conservation information: four statewide residential case studies.** Peelle, E.; Braid, R.B.; Jones, D.W.; Reed, J.H. (Oak Ridge National Lab., TN (USA)). Sep 1983. Contract W-7405-ENG-26. 70p. NTIS, PC A04/MF A01. Order Number DE84004150.

Four state residential energy conservation programs are reviewed in terms of their origins, evolutions, purposes and goals, administration, organization, and outcomes. The four programs chosen were selected from among 30 nominated by state energy offices and regional Department of Energy personnel as being illustrative in terms of organization and/or outcomes. While intended primarily for state-level program managers and staff, the profiles of programs, conclusions, and recommendations should be useful to anyone interested in developing viable, action-oriented conservation programs. The four case studies included Oregon's Master Conserver program, Oklahoma's energy education project for low-income and elderly families, Virginia's workshops for heating dealers service and contractors, and Maine's three energy education projects - the Energy Bus, Energy Conservation Month, and the Home Energy Check-up. All four programs utilized Energy Extension Service (EES) funds from the federal government, and three were directly managed through the state EES organization. The findings of the study indicate that these programs (1) had flexibility to experiment, iterate, and reorganize as a result of their initial experiences, (2) made extensive use of networking to involve local groups in program delivery, (3) employed a large variety of delivery methods, and (4) made substantial efforts to tailor literature and handouts to the target audiences.

33 ADVANCED AUTOMOTIVE PROPULSION SYSTEMS

REFER ALSO TO CITATION(S) 10128, 10129

3301 Internal Combustion Engines

REFER ALSO TO CITATION(S) 9389, 10072, 10197

10178 **Hydrogen engine design data-base summary.** Swain, M.R.; Adt, R.R.; Escher, W.J.D.; Pappas, J.M. (University of Miami, Dept. of Mechanical Engineering, Coral Gables, FL). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 536-542(Aug 1983). (CONF-830812—). Contract AC01-80CS50093.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

A hydrogen-fueled automotive engine design data-base now exists as a consequence of a multi-year, DOE-supported research project at the University of Miami. The effort encompassed the testing of 19 different configurations of an appropriately-modified 1.6 liter displacement, light-duty automotive engine. The design data includes engine performance and emissions over a maximal load range, generally at a fixed speed (1800 rpm) and best efficiency spark advance. This range was sometimes limited by intake manifold backfiring and leanlimit restrictions. However, effective measures were demonstrated for obviating these problems. High efficiency and specific power, and low emissions capabilities were demonstrated.

10179 **New perspectives for advanced automobile diesel engines.** Tozzi, L.; Kamo, R.; Sekar, R.R.; Wood, J.C. (Cummins Engine Company, Inc., Columbus, Indiana). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 600-608(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Computer simulation results are presented for advanced automobile diesel engine performance. Four critical factors for performance enhancement were identified: part load preheating and exhaust gas energy recovery, fast heat release combustion process, reduction in friction, and air handling system efficiency. Four different technology levels were considered in the analysis. Simulation results are compared in terms of brake specific fuel consumption and vehicle fuel economy in km/liter (miles per gallon). Major critical performance sensitivity areas are: combustion process, expander and compressor efficiency, and part load preheating and compound system. When compared to the state of the art direct injection, cooled, automobile diesel engine, the advanced adiabatic compound engine concept showed the unique potential of doubling the fuel economy. Other important performance criteria such as acceleration, emissions, reliability, durability and multifuel capability are comparable to or better than current passenger car diesel engines.

10180 **Two-phase turbine staging.** Elliott, D.G. (Jet Propulsion Laboratory, California Institute of Technology, Pasadena, California). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 642-647(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Two-phase turbines would be useful in Rankine cycles using low-quality or saturated-liquid working fluids. The chief problem is low efficiency due to slip losses in nozzles and due to liquid impact and friction losses in rotors. To raise efficiency, a staging method was tested in which the first stage operated at high speed with low relative liquid velocity, and the second stage recovered the first-stage exit energy. The theoretical efficiency for an experimental turbine operating with Refrigerant-22 was raised from 55 percent to 66 percent, and the measured efficiency was raised from 52 percent to 57 percent.

10181 **Influence of gas composition on the knocking behaviour of spark-ignited gas engines.** Duebel, M.; Schmillen, K.; Wackertapp, H. pp 952-964 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Research work undertaken to investigate the effect of gas composition on the knocking behavior of an unsupercharged, four-stroke, spark-ignited gas engines is discussed. Tests were made on a single-cylinder research engine. Group L and group H natural gases were used as base gases. To obtain gas mixtures with a wide range of methane numbers, hydrogen and butane were added to the natural gases in various proportions. The experiments were for different throttling conditions. Engine parameters varied and included speed, compression ratio, fuel/air ratio and mixture temperature. To identify the knock limit for specific engine operating conditions (fuel/air ratio, speed and mixture temperature), the spark timing was changed; and torque and the knock amplitude were measured.

3302 External Combustion Engines

10182 **(DOE/NASA/51040—49) Downsizing assessment of automotive Stirling engines.** Knoll, R.H.; Tew, R.C. Jr.; Klann, J.L. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Sep 1983. Contract AI01-77CS51040. 39p. (NASA-TM—83468). NTIS, PC A03/MF A01. Order Number DE84005060.

A 67 kW (90 hp) Stirling engine design, sized for use in a 1984 1440 kg (3170 lb) automobile has been serving as the focal point for developing automotive Stirling engine technology under a current DOE/NASA R and D program. Since recent trends are to-

wards lighter vehicles, an assessment was made of the appicability of the Stirling technology being developed for smaller, lower power engines. Using both the Philips scaling laws and a Lewis Research Center (Lewis) Stirling engine performance code, dimensional and performance characteristics were determined for a 26 kW (35 hp) and a 37 kW (50 hp) engine for use in a nominal 907 kg (2000 lb) vehicle. Key engine elements were sized and stressed and mechanical layouts were made to ensure mechanical fit and integrity of the engines. Fuel economy estimates indicated that the Stirling engine would maintain a 30 to 45 percent fuel economy advantage over comparable spark ignition and diesel powered vehicles in the 1984 time period. In order to maintain the performance advantage, particular attention must be paid to the Stirling engine mechanical losses and, although evaluated in this report, the cold start penalties.

10183 **(DOE/NASA/51040—50) Evaluation of CO_2 and CO dopants in hydrogen to reduce hydrogen permeation in the Stirling engine heater heat tube alloy CG-27.** Misencik, J.A. (National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center). Jul 1983. Contract AI01-77CS51040. 32p. (NASA-TM—83535). NTIS, PC A03/MF A01. Order Number DE84005397.

Tubes of CG-27 alloy were pressurized with hydrogen doped with various amounts of carbon dioxide or carbon monoxide. The tubes were heated in a diesel-fuel-fired Stirling engine materials simulator test rig for 100 hours at 820°C and 15 MPa pressure. Carbon dioxide was most effective in reducing hydrogen permeation in clean and in prior exposed tubes. After heating intially clean tubes for 100 hours at 820°C and 15 MPa pressure using 1.0, 0.1 and 0.05 vol % CO_2, hydrogen permeability coefficients of 0.5, 1.0 and 1.8 x 10^{-6} cm^2/s MPa/sup 1/2/ resulted, respectively. For pre-oxidized tubes the 0.1 vol % CO_2 maintained the value of 0.5 x 10^{-6} cm^2/s MPa/sup 1/2/ while the value increased to 0.7 x 10^{-6} cm^2/s MPa/sup 1/2/ for the 0.05 vol % CO_2 level. Carbon monoxide as a dopant was less effective than carbon dioxide at a given dopant level. For example, the 0.05 vol % CO dopant level resulted in a hydrogen permeability coefficient of 2.5 x 10^{-6} cm^2/s MPa/sup 1/2/ for clean tubes and a value of 1.0 x 10^{-6} cm^2/s MPa/sup 1/2/ for pre-oxidized tubes. These results are in agreement with the concept of the CO_2 and CO dopants reacting with the tube alloy to form an oxide film on the internal tube wall which acts as a barrier to hydrogen permeation.

10184 **Effects of pressure-drop correlations on Stirling engine predicted performance.** Chen, N.C.J.; Griffin, E.P. (Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 708-713(Aug 1983). (CONF-830812—). Contract W-7405-ENG-26.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Pressure-drop correlations for Stirling engine applications were studied from three perspectives: sensitivity studies of their effects on predicted engine performance, presentation of an improved correlation for steady unidirectional flow through wire-screen matrices, and a theoretical analysis of friction factors for oscillating laminar flow through circular tubes. The sensitivity studies of two reference engines show significant effects of regenerator pressure drop on engine performance. The improved friction factor correlation for steady unidirectional flow fits the data satisfactorily with an uncertainty of about + or - 10%. The derived friction factor for oscillating flow is shown to be characterized by two Reynolds numbers: steady and kinetic. When this friction factor is compared with the one for steady unidirectional flow, no significant difference is observed when the kinetic Reynolds number is small, but there is a considerable increase at high kinetic Reynolds numbers.

10185 **Dynamic analysis of the fluidyne.** West, C.D. (Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 779-784(Aug 1983). (CONF-830812—). Contract W-7405-ENG-26.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The dynamic behavior of the liquid-piston Stirling engine is analyzed using the vector or phasor method of representing the motions of coupled systems. The result, for the first time, is a simple physical explanation of the feedback mechanism most frequently employed in these machines. In addition, the method leads to an easy derivation of certain results already known from experimentation or from more complex analyses.

10186 **Automotive Stirling Engine Development Program Mod I Stirling engine development.** Simetkosky, M.A. (Mechanical Technology, Inc., Latham, NY). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 856-862(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The Automotive Stirling Engine (ASE) Development Program was established to enable research and development of alternate propulsion systems. The program was awarded to Mechanical Technology Incorporated (MTI) for the purpose of developing an automotive Stirling engine, and transferring Stirling-engine technology to the United States. MTI has fabricated and tested four Mod I engines that have accumulated over 1900 test hours to date. The engines evaluated in the test cell have achieved an average of 34.5% efficiency at their maximum efficiency point (2000 rpm), and have developed an average maximum output power (power available to the drive train) level of 54.4 kW (73.2 bhp). All engines are still operating, and are being used to develop components and control strategy for the Upgraded Mod I engine design (predicted to increase maximum power output and efficiency while reducing total engine system weight).

10187 **Stirling engines with controlled evaporation of a two-phase two-component working fluid.** West, C.D. (Oak Ridge National Laboratory, Oak Ridge, Tennessee). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 2: 914-917(Aug 1983). (CONF-830812—). Contract W-7405-ENG-26.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

The specific power of a Stirling engine can be greatly increased by evaporating liquid in the hot expansion-space region. Theory and experiment have indicated that a twofold to threefold increase is possible. This paper shows that by controlling the rate at which the liquid is evaporated into the expansion cylinder and the phase of the cycle at which the evaporation takes place, still larger increases may be achieved under quite reasonable operating conditions. Successful application of this principle would make it practical to operate simple low-pressure engines with moderate hot-end temperatures and perhaps even with the very low temperatures associated with simple nontracking solar collectors and with certain reject heat streams.

10188 **Stirling analysis code validation using free-piston engine base line data.** McLennan, G.A.; Daley, J.G.; Heames, T.J. (Argonne National Laboratory, Argonne, Illinois). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 5: 2196-2202(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Experience using the SEAM1 (Stirling Engine Analysis Module) computer code to model a 1-kWe free-piston Stirling engine is described. The development of SEAM1 and the series of experimental measurements used for validation are part of a Department of Energy sponsored program for improvement of Stirling cycle technology, where emphasis is on validated analytical techniques for modeling Stirling cycle physical processes as well as design concepts which improve performance. Code calculations are shown to agree well with measurements over a range of operating conditions.

3303 Electric-powered Systems

REFER ALSO TO CITATION(S) 9957, 9960, 9964, 9965, 10051, 10052

10189 **(DOE/CS/50120—T1) Electric vehicle demonstration program. Contract management summary and final technal report.** DePue, D.L. (West Virginia Univ., Morgantown (USA)). 14 Oct 1981. Contract FG01-79CS50120. 23p. NTIS, PC A02/MF A01. Order Number DE84002122.

It was the purpose of this study to acquire an electric vehicle, use it in normal fleet operations on a variety of assignments, and evaluate its effectiveness as part of an institutional fleet. An Electrovan 600 was purchased and assigned to West Virginia University's Physical Plant fleet. It was rotated through a series of selected Physical Plant shops on two week assignments. Data was collected on the electric van's performance and compared to driver rated performance of the shops standard internal combustion (IC) engine van. While the electric van was found to be well suited for most university maintenance assignments, it was evident that specialized training is necessary for drivers. It is also recommended that vehicles not be rotated through a number of drivers. A minimum of assigned drivers saves on maintenance. The EV 600 was found to be in need of engineering refinements, especially in the clutch and other drive train components. This model may not be suitable for general fleet use. However, the electric vehicle in concept proved to be able to handle many fleet assignments. Maintenance savings are apparent. Energy savings were most significant. The EV 600 was operated for 1/4th the energy cost of the standard IC van.

10190 **Electric vehicles in fleet operation at Detroit Edison.** Murray, G.O.; Ostrowski, G.J. *Energy Technology (Washington, D.C.);* **9**: 1297-1307(Jun 1982). (CONF-820217—).

From 9. energy technology conference; Washington, DC, USA (16 Feb 1982).

Detroit Edison operates a fleet of 24 electric cars in a cost-sharing demonstration program with the United States Department of Energy. The program features a unique lease program in which electric passenger cars are used by Detroit Edison employees for their personal driving needs, such as commuting to work, shopping, etc. Over 50,000 miles have been logged on the 24 cars during the first six months of operation. The project began in June, 1981. This paper describes the lease program and the Electric Car Service Center, charging stations and other facilities which Detroit Edison has set up to support the program.

3304 Hybrid Systems

10191 **A microcomputer controlled hybrid vehicle with on-board battery charger.** King, R.D.; Park, J.N.; Suj, C.F.; Szczesny, P.M. (General Electric Company, Schenectady, NY). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 1405-1411(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

A custom designed microcomputer controller, using a dual Intel 8086 microcomputer system, controls the hybrid vehicle during driving, regenerative braking, and battery charging. The hybrid powertrain contains a dc electric motor, gasoline engine, automatic transmission with torque converter removed, engine and motor clutches, and Hy-Vo transfer chains. Hybrid vehicle control, propulsion source sequencing and transmission sequencing are reviewed in the initial section of this paper. The microcomputer controlled high frequency on-board battery charger uses wall-plug electricity to simultaneously charge two banks of propulsion batteries. Details of battery charger features, computer control concepts and algorithms, power circuit design, electronic charger control, ground continuity detector, and charger sensors are presented. Battery charger operational tests and vehicle performance results are presented.

3305 Flywheel Propulsion

10192 **Impact of flywheel energy storage technology upon taxicab fleet operation in a large metropolitan city.** Krupka, M.C.; Jackson, S.V. (Los Alamos National Lab., NM). pp 453-455 of 4th Miami international conference on alternative energy sources. Veziroglu, T.N. (ed.). Coral Gables, FL; Univ. of Miami (1982). (CONF-811212—).

From 4. international conference on alternative energy sources; Miami Beach, FL, USA (14 Dec 1981).

3306 Vehicle Design Factors

10193 **(PB—83-251934) Minicars research safety vehicle program. Phase 3. Volume 1. Technical final report. Report for Jan 1977-Sep 1981.** Ausherman, V.K.; Khadikar, A.V.; Syson, S.R.; Strother, C.E.; Struble, D.E. (Minicars, Inc., Goleta, CA (USA)). Sep 1981. 350p. (FR—2100-09-81-VOL-1). NTIS, PC A15/MF A01.

The objective of the RSV Program was to provide research and test data applicable to the automobile safety performance requirements for the mid-1980s, and to evaluate the compatibility of these requirements with environmental policies, efficient energy utilization, and consumer economic considerations. The RSV Program has demonstrated that it is possible to make cars much safer than they are presently. It has produced automobile designs that are consistent, at affordable cost, with the national objectives for fuel economy and environmental protection. It has indicated, at least to a limited degree, that the technological findings are applicable, at varying levels, to a variety of car designs. And it has provided evidence that these findings can be wrapped in a package of considerable appeal to the public. This Final Report is a comprehensive compilation of the findings of the Phase III efforts of Minicars, Inc. It describes the design and testing of the RSV systems, and the performance levels achieved.

10194 **(PB—83-251942) Minicars research safety vehicle program. Phase 3. Volume 2. Appendices. Final report Jan 1977-Sep 1981.** Ausherman, V.K.; Khadikar, A.V.; Syson, S.R.; Strother, C.E.; Struble, D.E. (Minicars, Inc., Goleta, CA (USA)). Sep 1981. 301p. (FR—2100-09-81-VOL-2). NTIS, PC A14/MF A01.

The objective of the RSV Program was to provide research and test data applicable to the automobile safety performance requirements for the mid-1980s, and to evaluate the compatibility of these requirements with environmental policies, efficient energy utilization, and consumer economic considerations.

3307 Emission Control

10195 **(PB—83-260174) Study of emissions from light-duty vehicles in Denver. Final report.** (Automotive Testing Labs., Inc., Aurora, CO (USA)). 31 Aug 1981. 34p. NTIS, PC A03/MF A01.

A sample of 300 light-duty vehicles normally operated in the Denver metropolitan area was tested for emissions and fuel economy. The vehicles were from the 1978 through 1982 model years and included both passenger cars and light-duty trucks. One purpose of the program was to gather information for calculations and projections of ambient air quality. Another purpose was to assemble data on current model year vehicles for use in the support of Inspection/Maintenance and other regulatory programs. The vehicles were tested for exhaust emissions utilizing the Federal Test Procedure, the Highway Fuel Economy Test (HFET), and four short mode tests. 125 vehicles from the 1980-82 model years received an evaporative emission test using the sealed housing evaporative determination (SHED) technique. Other actions were taken in relation to each vehicle tested. These included an engine and emission control system maladjustment/disablement and status inspection, driveability evaluations, and owner interviews to obtain vehicle maintenance and usage data.

3308 Alternative Fuels

REFER ALSO TO CITATION(S) 9324, 9557, 9559, 10130

10196 (LA—9829-MS) Gaseous fuel safety assessment for light-duty automotive vehicles. Krupka, M.C.; Peaslee, A.T.; Laquer, H.L. (Los Alamos National Lab., NM (USA)). Nov 1983. Contract W-7405-ENG-36. 80p. NTIS, PC A05/MF A01. Order Number DE84004532.

The relative safety of gaseous and liquid fuels utilized for light-duty automotive transportation was assessed. The specific fuels considered were compressed natural gas (CNG), liquefied natural gas (LNG), liquefied petroleum gas (LPG), and as reference, gasoline and diesel fuel. The assessment methodology describes and develops the relative hazards of these fuels from an integrated generic physicochemical property and accident scenario point of view. Fuel-relative safety rankings were established by eliciting expert judgment and combining that judgment with a comparative scoring methodology. Selected accident scenarios included fuel leakage in both residential and public garages; fueling line rupture at a refueling station in the presence of user vehicles or delivery vehicles; and vehicle collisions under rural, urban, and vehicular tunnel conditions. Results permit the generation of selected safe handling criteria.

10197 (LBL—16622) Coal-fueled diesel engines. Robben, F. (Lawrence Berkeley Lab., CA (USA)). Aug 1983. Contract AC03-76SF00098. 14p. (CONF-8310223—1). NTIS, PC A02/MF A01. Order Number DE84002908.

From Society of Automotive Engineers meeting; San Francisco, CA, USA (31 Oct 1983).

The use of pulverized coal as a fuel for diesel engines can be a practical and efficient means of substituting coal for oil and gas in medium size applications such as railroad locomotives, ships and industrial stationary and co-generation power. These applications could result in reducing the oil and gas consumption of the US by 2% to 10%, depending on the market penetration. The extensive German development of the use of pulverized coal in diesels during the period 1930 to 1944 demonstrated that coal-fueled diesels can be a practical heat engine. Although the German development used dry pulverized coal as a fuel, it now appears that beneficiated coal-water slurries will be a more practical and economical form of fuel. Operation on coal-water slurries is likely to pose some problems with ignition and particle agglomeration which require investigation. The background on coal-fueled diesel engines is reviewed and the potential applications and benefits are briefly presented. The technical problems in developing a coal-water slurry diesel are reviewed and possibilities for overcoming these problems are presented and discussed. A coal-fueled diesel research and development program is recommended.

36 MATERIALS

REFER ALSO TO CITATION(S) 10151

10198 (DOE/ER/01198—1404) Science of materials. Progress report, January 1-December 21, 1982. (Illinois Univ., Urbana (USA). Materials Research Lab.). 1982. Contract AC02-76ER01198. 283p. NTIS, PC A13/MF A01. Order Number DE84005153.

Portions are illegible in microfiche products.

Progress is reported in the following areas: metallurgy and ceramics (structure of materials, mechanical properties, physical properties), experimental research, and particle-solid interactions (irradiation effects on alloys). (DLC)

10199 (DOE/ER/45005—1) Two dimensional colloidal systems. Technical progress report. Meyer, R.B. (Brandeis Univ., Waltham, MA (USA). Dept. of Physics). 1983. Contract AC02-83ER45005. 6p. NTIS, PC A02/MF A01. Order Number DE84005148.

Efforts since May, 1983, have necessarily concentrated on numerous practical aspects of this project. We are refining what appears to be a very promising sample preparation technique in parallel with preparation of other systems for experiments on high quality samples as they become available. Emphasis was on the preparation of high quality interfacial colloids, consisting of micron-size polystyrene spheres trapped at the water-air interface.

10200 (RISO-M—2375) Example of progress and future perspectives in X-ray synchrotron diffraction studies. Als-Nielsen, J. (Risoe National Lab., Roskilde (Denmark)). Mar 1983. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704454.

The development in diffraction studies of 2-dimensional mono-atomic films physisorbed on graphite over the past decade is described. Synchrotron X-ray diffraction studies represent a breakthrough in this field and future possibilities are mentioned.

10201 Yield vectors in F.C.C. crystals. Kocks, U.F.; Canova, G.R.; Jonas, J.J. (Materials Science and Technology, Argonne National Laboratory, Argonne, IL 60439). *Acta Metallurgica;* 31: No. 8, 1243-1252(Aug 1983).

The properties of the single-crystal yield surface, which are required for a derivation of polycrystal behavior in different deformation modes and for a theory of texture development, are derived and tabulated for materials of the face-centered cubic (f.c.c.) lattice structure. A procedure is proposed for transforming the 5-dimensional yield surface of the crystal into an arbitrary coordinate system, and for sectioning it into sub-stress-spaces of less than five dimensions. In this way, the yield vectors that describe vertices in the required subspace can be found, and the active slip system combination derived for each grain. Applications to the frequently occurring cases of deformation under mixed boundary conditions are outlined.

3601 Metals And Alloys

REFER ALSO TO CITATION(S) 9220, 9222, 9223, 9237, 9243, 9244, 9245, 9246, 9247, 9248, 9385, 9399, 9400, 9484, 9486, 9690, 9789, 9791, 9793, 9794, 9795, 9796, 9797, 9798, 9799, 9800, 9813, 10183, 10354, 10372, 10373, 10439, 10466, 10552, 10576, 10620, 11007

10202 (AD-A—131018/4) Metallurgical characterization of niobium/tin superconducting multifilamentary wires. Final report 1 Apr-31 Dec 1982. Roberts, J.M. (Rice Univ., Houston, TX (USA). Dept. of Mechanical Engineering). 31 Mar 1983. 39p. NTIS, PC A03/MF A01.

The origin of a high incidence of discontinuous Nb filaments in Niobium/bronze multifilamentary drawn wires is discussed. It is suggested their occurrence is most likely an intrinsic part of the manufacturing process. Studies on the application of the limiting grain size concept in the bronze by the Nb filaments, suggests this effect only sets an upper bound on the attainable grain size and in reality, the actually observed grain size and sub-grain size is lower than this upper bound. This leads to extensive hardening of the bronze phase as the Nb/bronze multifilamentary wires are progressively reduced to ultra-fine dimensions. Preliminary ageing studies of a 13 wt % Sn bronze alloy, suggest the alpha bronze may exhibit some age hardening decomposition phenomena in the 300 to 400 degree C temperature range for unprestrained solution heat treated and quenched material. An even stronger hardening phenomena in this temperature range occurs if the material is prestrained 65% in compression after solution heat treatment but prior to ageing. Contemplated further studies in the area are presented.

10203 (AD-A—132631/3) Structure and behavior of vacuum plasma sprayed overlay coatings on nickel based superalloys. Master's thesis. Norton, P.R. (Naval Postgraduate School, Monterey, CA (USA)). Jun 1983. 49p. NTIS, PC A03/MF A01.

The feasibility of using the plasma spray technique for the application of metallic overlay coatings to marine gas turbine components was evaluated. Nickel based superalloy pins were sprayed with various MCrAl coatings using the plasma spray technique, given several types of surface treatments, and then oxidized at 1000 Degrees Centigrade for 100 hours. The effects of the various post-coating treatments on the coating structure and subsequent oxide behavior were investigated.

10204 **(AD-A—132999/4) Development of improved lacv-30 propeller blade coatings for protection against sand and rain erosion and marine environment corrosion. Final report 4 Jan 1982-4 Mar 1983.** Malone, G.A. (Bell Aerospace Textron, Buffalo, NY (USA)). 10 May 1983. 134p. NTIS, PC A07/MF A01.

An investigation was conducted of candidate systems offering potential erosion and corrosion protection when applied as coatings to Aluminum 7075 alloy propeller blades used to propel air cushioned vehicles operating in severe environments. This work focused on (1) special hard anodized and (2) hard nickel electroplated coatings as candidate protective systems with sand/rain erosion testing to evaluate their merits. Attributes of the coating systems developed and studied included: For (1) Ways and means to produce and control deposit hardness for optimum erosion resistance, methods of bonding to blades for high integrity adhesion, and inclusion of sacrificial corrosion protection electroplates in the coating systems (zinc and zinc-nickel alloy). For (2) Incorporation of dry film lubricant systems on sealed hardcoats of various anodic coating thicknesses to enhance erosion performance. Study results indicated that anodized coatings did not provide suitable erosion protection to Aluminum 7075 in sand/rain environments, even with dry film lubricant supplemental films. Electroplated hard nickel coatings, Vickers hardnesses in the range of 380 to 440, appeared better for combined sand/rain erosion resistance based on comparisons with prior work. Dilute phosphoric anodizing the aluminum substrates led to excellent bonds and improved corrosion resistance when subsequently plated with ductile nickel from a low pH bath, followed by hard nickel electroplate.

10205 **(AERE-M—3287) Variation in cooling rate in a 35 mm thick steel block using different cooling media.** Jordan, G.R. (UKAEA Atomic Energy Research Establishment, Harwell. Metallurgy Div.). Mar 1983. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704536.

The objectives of this study were to determine and compare cooling rates of a 70 x 70 x 35 mm steel block during: (i) air cooling; (ii) water quenching; (iii) oil quenching and then to decide on a means of producing a cooling rate of approximately 50 deg C/min and examine the variation of the cooling rate through the thickness of the specimen blank. Experimental details are given. Results are reported and discussed.

10206 **(BNL—33981) Detection and performance of defects in aluminum coated steels.** Isaacs, H.S.; Jackson, R. (Brookhaven National Lab., Upton, NY (USA); Army Armament Research and Development Command, Dover, NJ (USA)). 1983. Contract AC02-76CH00016. 9p. (CONF-831086—10). NTIS, PC A02/MF A01. Order Number DE84004175.

From Electrochemical Society fall meeting; Washington, DC, USA (9 Oct 1983).

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The measured variations in current density resulting from exposed steel and iron containing inclusions have been used as a nondestructive method for locating these heterogeneities on aluminum coated steel. The measurements were carried out with a vibrating probe in a borate solution where the dissolution rates of both iron and aluminum are sufficiently low to prevent any damage to the coating or underlying metal. The difference in the anodic and cathodic polarization behavior of predominant inclusions was used to determine the ratio of their relative contributions to the applied current.

10207 **(BNL-NUREG—33806) Technique for characterizing crevice corrosion under hydrothermal conditions.** Jain, H.; Ahn, T.M.; Soo, P. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 38p. (CONF-8311126—1). NTIS, PC A03/MF A01 - GPO. Order Number DE84002871.

From International symposium on laboratory corrosion tests and standards; Bal Harbour, FL, USA (14 Nov 1983).

The current/potential results show that the crevice corrosion incubation period for a Grade-12 titanium crevice formed between two Teflon plates is about two days at 150°C. Optical and SEM observations show that the corrosion starts as isolated pitting which spreads along the surface as shallow pits. The corrosion conditions change significantly as the TiO_2 corrosion product fills the crevice, and the rate of corrosion may be greatly reduced after several days. The rate of crevice corrosion of commercial purity (Grade-2) titanium under similar consitions is approximately three orders of magnitude higher. In this case, active dissolution of metal starts during the initial heating of the autoclave and the incubation period is negligible.

10208 **(CEA-CONF—6685) Creep embrittlement of austenitic stainless steels with titanium addition.** Felsen, M.F. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 4p. (CONF-830418—10). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750266.

From International conference on dimensional stability and mechanical behavior of irradiated metals and alloys; Brighton, UK (11 Apr 1983).

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Some cold-worked austenitic stainless steels of the 316 type with titanium addition exhibit a low creep ductility and a notch sensitivity in the temperature range of 550°C to 750°C and for times to rupture from 10 to 10000 hours. It has been shown that this embrittlement increases highly with cold-work percentage, with solution annealing temperature, and depends on chemical composition because these factors can modify the difference of hardness between grains and grain boundaries.

10209 **(CEA-CONF—6691) Transport of carbon in 316 steels submitted to neutron irradiation.** Rouault, J.; Galland, L.; Cytermann, R.; Colin, M. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Apr 1983. 17p. (In French). (CONF-830418—11). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750276.

From International conference on dimensional stability and mechanical behavior of irradiated metals and alloys; Brighton, UK (11 Apr 1983).

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The carburization of fast reactor cladding material may affect its mechanical properties and give rise to severe embrittlement. Carbon profiles were determined by EMPA in various irradiated carburized clads. All clads were in 316 type steels. An effective diffusion coefficient (Dsub(eff)) has been calculated for each profile. The set of Dsub(eff)) is shown in an Arrhenius Diagram. The experimental dispersion on Dsub(eff)) calculated values is due to the non-applicability of the model to a few profiles. The analysis is then made on the remaining Dsub(eff)). These values constitue a good coherent set of points. A comparison is then drawn between this set of points and: - true diffusion coefficient of carbon in the gamma phase, - effective diffusion coefficients of carbon derived from out-of-pile simulation experiments. Activation energy of Dsub(eff) coefficient (in pile and out-of-pile) is small compared too the activation of carbon diffusion in austenite. Dsub(eff) values are quite insensitive to surface concentration in the range 0,9 - 4%. Diffusion time is shown to have a great influence on Dsub(eff): Dsub(eff) decreases as time increases. A Dsub(eff) value for simple evaluations of carburization intensity in irradiated 316 steels is recommended.

10210 **(CEA-CONF—6692) Life prediction in low cycle fatigue using elastic analysis.** Tortel, J.; Petrequin, P.; Roche, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 19p. (CONF-8304141—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750265.

From ASME international conference on advances in life prediction methods; Albany, NY, USA (18 Apr 1983).

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First, a brief review of the methods proposed in open literature and in construction codes is done. Then, a comprehensive mechanical analysis shows that inelastic behavior leads to a magnification of elastically computed strain. This magnification is strongly related to the mechanical behavior of the component. It is low when kinematic requirements are prevailing and large when static requirements are dominant. In both cases, strain magnification value

is easy to estimate. Intermediate cases are most difficult to analyse but methods like NEUBER's rule are well suited for practical cases. As a result of this analysis, a practical method is presented. The elastic computed strain range is divided in three parts. The first is the one which is load-controlled: either external forces or elastic follow-up are involved. For this part the magnification factor is easy to obtain. The second one is deformation controlled (usually only peak thermal strains). No magnification factor is applied to this part. The magnification factor for the third part is given in a chart as a function of temperature and elastic strain range. Charts are given for each specified material. They were derived from cyclic stress-strain curves according to the following assumption: the square root of the stress-strain product is not magnified. For high temperature prediction, the cyclic curves are corrected in order to account for the hold time effect.

10211 **(CEA-CONF—6744) Swelling of structural materials in fast neutron reactors.** Seran, J.L. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 21p. (In French). (CONF-8306146—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750283.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

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The physical origin of swelling in irradiated materials and the main parameters acting on swelling of SS 316 are examined: temperature, neutron dose, dose rate, chemical composition, strain hardening. Results obtained, in Rapsodie and Phenix reactors, with fuel cans and with the hexagonal tube containing the fuel pins are analyzed and compared with results found in litterature. In conclusion hot swelling of SS 316 is too important at high doses and is will be replaced by austenitic steels stabilized by Ti and ferritic steels or high nickel steels with structural hardening.

10212 **(CEA-CONF—6745) Microstructure evolution of stainless steel 316 irradiated by neutrons.** Levy, V.; Le Naour, L.; Boulanger, L.; Gilbon, D. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 13p. (In French). (CONF-8306146—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750273.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

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Microstructure evolution is reviewed with some examples. Interaction between the different parameters of the microstructure are discussed, in particular dislocation evolution, segregation induced by neutron irradiation, stability and chemical composition of phases produced by precipitation, vacancies and swelling.

10213 **(CEA-CONF—6746) Properties and mechanical behaviour of fuel cans of fast neutron reactors.** Cauvin, R.; Boutard, J.L. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 2p. (In French). (CONF-8306146—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750282.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

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Mechanical properties of stainless steel-316 irradiated up to 100 dpa in fast neutron reactors are examined. Microscopic phenomena involved are reviewed: precipitation, segregation, dislocations, vacancies. Influence on mechanical behaviour of materials are examined: tensile properties, creep, ductility. Consequences on reactor dimensioning are given in conclusion.

10214 **(CEA-CONF—6747) Study of swelling by simulation.** Gilbon, D.; Le Naour, L.; Didout, G. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 19p. (In French). (CONF-8306146—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750284.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

Fuel cans and hexagonal tubes containing the pins must withstand high irradiation doses (220 or even 275 dpa) with a low swelling. Qualification of a new alloy for claddings requires several years of irradiation on a reactor. For a fast first selection simulation by 1MeV electron or heavy ions enhance radiation damages. Principles of these techniques are recalled and some examples mainly with steel 316 are given. Results are compared with results obtained in reactor to determine simulation limits. The method is not valid in the case of a structural instability of the irradiated material in a reactor.

10215 **(CEA-CONF—6748) Irradiation effects on zircaloy.** Morize, P. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 17p. (In French). (CONF-8306146—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750262.

From 26. colloquium on metallurgy; Saclay, France (20 Jun 1983).

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In a water cooled reactor, the neutron effect on zirconium base alloys which are used in the core, is a twofold one: - indirect effect, by means of modifications to the alloy environment; - direct effect occurence of irradiation defects in the material. The indirect effect results in an increase of the water corrosion, as a consequence of the water radiolysis and in stress-corrosion, due to fission products such as iodine, cesium, cadmium... The paper will describe the consequence of these phenomena and the means used to remedy their harmful effects. The occurence of irradiation defects has three consequence: - Material strengthening: the yield and ultimate stresses are increased by 45 and 35% respectively for the cold worked and stress-relieved zircaloy while the uniform elongation, rather low before irradiation, practically does not decrease (fluence 5.10^{21} n/cm^2). Yield and ultimate stresses of annealed zircaloy are increased by about 150% while uniform elongation decreases from 8 to 1% in the same conditions. - Material growing it is a change in dimensions in the absence of any applied stress. It depends on the crystallography texture, metallurgical state of the material and irradiation temperature. - Material creeping: in the normal working conditions of a reactor, it is the main source of deformation. It depends on temperature, stress, neutron flux and metallurgical state of the material.

10216 **(CEA-CONF—6749) Influence of composition and thermomechanical treatment on EM 12 properties.** Felsen, M.F.; Aubert, H.; Laniesse, J.; Le Bret, P. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 9p. (CONF-830659—20). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750274.

From TMS/AIME topical conference on ferritic alloys for use in nuclear energy technologies; Snowbird, UT, USA (19 Jun 1983).

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EM 12 ferritic steel (Cr 9-Mo 2, V Nb) is well known as material for superheater at temperature up to 600°C in fossil fuel plant. As a consequence of its strength at elevated temperature, utilization in liquid metal fast breeder reactor is considered out of irradiation in the steam generator and under high neutron flux in the core. For fast breeder reactor components, special fabrication sequences including cold work and recrystallization are sometimes used. In the reactor, carbon transport may decrease carbon content and affect creep properties. EM 12 structure, creep and tensile strength were studied after a number of thermomechanical treatments. The effect of composition, carbon content (0.02 to 0.12 W %) and nickel content (0 and 2.2 W %) has been considered. Microstructural parameters especially grain size and amount of precipitates of intermetallic compounds have a significant effect on high temperature tensile strength and creep behavior. Carbon content is also important, but even for very low carbon content the high temperature mechanical properties can be considered as acceptable.

10217 **(CEA-CONF—6762) Damaging by fatigue and creep of PWR fuel cans. Programme and work in progress.** Brun, G. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 9p. (In French). (CONF-8306147—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750286.

From Seminar on nuclear fuels; Moscow, USSR (20 Jun 1983).

The experimental programme consists in the study of rods, tubes and irradiated cans of zircaloy 4. Up to now only rods have been examined. Tensile properties, creep, low cycle fatigue and microstructure of industrial zircaloy 4 are determined at 20°C and 350°C with recrystallyzed or annealed material. Results are compared with those of litterature but more results are needed for a statistical analysis.

10218 **(CEA-CONF—6796) Depassivation and repassivation of austenitic stainless steels. Consequences on stress corrosion cracking.** Helie, M.; Desjardins, D.; Puiggali, M.; Petit, M.C. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Jun 1983. 4p. (CONF-830534—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750281.

From 5. international symposium on passivity; Bombannes, France (30 May 1983).

The influence of strain rate and solution temperature on depassivation and repassivation processes, and the consequences on stress corrosion cracking phenomenon are presented. The tests are performed in concentrated magnesium chloride solutions at various boiling temperatures (160°C, 153°C, 140°C, 130°C, 125°C, 110°C, 102°C) to which potassium dichromate is added in some cases. The depassivation and repassivation of the tested wires are analysed in term of current-time curves at fixed potential. The wire is placed into a "corrosion cell" with the boiling chloride solution on a tensile testing machine. Tests at 153°C on 304L and 309L stainless steels show that competition between passivation and depassivation depends on applied strain rate: at low strain rates rupture is mainly due to mechanical stress, at high strain rates the wire shows track of corrosion and the rupture is ductile. Between the two, stress corrosion cracking presents a maximum and in this case the rupture is mainly brittle. Influence of temperature shows the existence of a transitional temperature 130°C for a 304L. The cracking velocity is 100 times higher above 130°C than below and the cracking mode is transgranular and mainly intergranular below 130°C. Addition of potassium dichromate modifies both electrochemical and mechanical properties; it is more difficult to obtain a frank depassivation and the repassivation rate is higher.

10219 **(CONF-831259—1) Fusion-relevant basic radiation effects: theory and experiment.** Mansur, L.K.; Coghlan, W.A.; Farrell, K.; Horton, L.L.; Lee, E.H.; Lewis, M.B.; Packan, N.H. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 79p. NTIS, PC A05/MF A01. Order Number DE84004458.

From US/Japan workshop on fusion reactor materials; Tsukuba, Japan (5 Dec 1983).

A summary is given of results of the basic radiation effects program at Oak Ridge National Laboratory, which are relevant to fusion reactor materials applications. The basic radiation effects program at ORNL is a large effort with the dual objectives of understanding the atomic and microstructural defect mechanisms underlying radiation effects and of determining principles for the design of radiation resistant materials. A strength of this effort is the parallel and integrated experimental and theoretical approaches in each major research area. The experimental effort is active in electron microscopy, ion irradiations and ion-beam techniques, neutron irradiations, surface analysis and in other areas. The theoretical effort is active in developing the theory of radiation effects for a broad range of phenomena and in applying it to the design and interpretation of experiments and to alloy design.

10220 **(CONF-8309193—2) Metallic interfaces and property modification.** Brodsky, M.B. (Argonne National Lab., IL (USA)). Sep 1983. Contract W-31-109-ENG-38. 14p. NTIS, PC A02/MF A01. Order Number DE84003716.

From International conference on the dynamics of interfaces; Lille, France (12 Sep 1983).

The electronic properties of Pd, Cr and V are modified by preparing them as epitaxial metal film sandwiches inside Au or Ag. New properties include near-magnetism or superconductivity on stretched Pd, high T/sub c/ superconductivity in fcc Cr and a lowered T/sub c/ in fcc V.

10221 **(DOE/ER—0113/2, pp 29-38) Solid breeder thermal properties.** Hollenberg, G.W. Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

The specific heat and thermal expansion of four solid breeder materials, LiO_2, Li_4SiO_4, Li_2ZrO_3 and $LiAlO_2$, have been measured. The specific heat at high temperatures (650°C) approaches the 3R theoretical limit for these materials. The thermal expansion of Li_2O, Li_4SiO_4, Li_2ZrO_3 and $LiAlO_2$ pellets was measured. The thermal expansion coefficients of Li_2O and Li_4SiO_4 are very high and may present problems in blanket operation; i.e., thermal stress failure and mechanical interaction.

10222 **(DOE/ER—0113/2, pp 99-124) Fusion neutron effects on magnetoresistivity of copper stabilizer materials.** Guinan, M.W.; Van Konynenburg, R.A. (Lawrence Livermore National Lab., CA). Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

Eight copper wires were repeatedly irradiated at 4.2 to 4.4 K with 14.8 MV neutrons and isochronally annealed at temperatures up to 34°C for a total of five cycles. Their electrical resistances were monitored during irradiation under zero applied magnetic field. After each irradiation the magnetoresistances were measured in applied transverse magnetic fields of up to 12 T. Then the samples were isochronally annealed to observe the recovery of the resistivity and magnetoresistivity. After each anneal at the highest temperature (34°C), some of the damage remained and contributed to the damage state observed following the subsequent irradiation. In this way, we were able to observe how the changes in magnetoresistance would accumulate during the repeated irradiations and anneals expected to be characteristic of fusion reactor magnets. For each succeeding irradiation the fluence was chosen to produce approximately the same final magnetoresistance at 12 T, taking account of the accumulating residual radiation damage. The increment of magnetoresistivity added by the irradiation varied from 35 to 65% at 12 T and from 50 to 90% at 8 T for the various samples.

10223 **(DOE/ER/10475—T2) Study and modeling of high temperature fatigue crack propagation in austenitic stainless steel. Final report, September 1, 1979-November 30, 1983.** Davidson, D.L. (Southwest Research Inst., San Antonio, TX (USA)). 1983. Contract AS05-79ER10475. 73p. NTIS, PC A04/MF A01. Order Number DE84005391.

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Fatigue crack tip strain and opening displacements have been measured for cracks grown in AISI Type 304 stainless steel at room temperature and at 600°C in both vacuum and air. A special cyclic loading stage for the scanning electron microscope was used to dynamically observe crack growth at room temperature, and crack growth was found to be intermittent. A similar growth pattern was inferred for crack growth at 600°C from crack growth rate data. Striation spacing measurements were in all cases greater than average crack growth rate measurements, also indicating intermittent growth. The crack tip measurements are combined with the dynamic observations in a crack tip failure model and a crack tip geometric model to help explain how fatigue cracks grow, and that the effects of temperature and environment are on this process.

10224 **(DOE/ER/45025—1) Structural and electronic properties of artificial metallic superlattices.** Falco, C.M. (Arizona Univ., Tucson (USA). Dept. of Physics). 1983. Contract AC02-83ER45025. 10p. (CONF-8309193—1). NTIS, PC A02/MF A01. Order Number DE84002771.

From International conference on the dynamics of interfaces; Lille, France (12 Sep 1983).

Recent progress in thin film deposition techniques has motivated renewed interest in artificially prepared metallic superlattices, exhibiting different physical properties than those in naturally occuring materials. This paper describes the sputtering technique used to prepare these metallic superlattices, as well as considerations affecting their purity, interfacial quality and crystallographic orientation. The contribution of the interfaces to the electronic transport

properties is described in terms of finite size effect theories. 15 references.

10225 **(FRNC-TH—1227) Measurement of the activity coefficient of carbon in steels in liquid sodium.** Surville, G. (Conservatoire National des Arts et Metiers (CNAM), 75 - Paris (France)). Jun 1983. 149p. (In French). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84750339.

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In sodium cooled fast reactors carbon is both a carbon impurity and element of structural materials. Carbon transfert through liquid sodium can produce carburization or decarburization of structural materials. Carbon content in sodium is determined with thin foils of austenitic alloys, when equilibrium is reached thermodynamic activity of carbon in sodium is deduced from carbon activity in alloys. Studied alloys are FeMn 20%, FeNi 30%, Z2CN 18-10 and Z3CND17-13. Carbon activity of alloys in sodium was between 5.10^{-3} and 10^{-1} at 600 and 650°C. Calibration was obtained with the alloys FeNi 30% in gaseous mixtures He-CO-CO_2 of known activity.

10226 **(GKSS—83/E/16) Radiation-induced changes of the ductility of amorphous $Fe_{40}Ni_{40}B_{20}$.** Gerling, R.; Schimansky, F.P.; Wagner, R. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 3 Nov 1982. 6p. Scr. Metall. v. 17 (1983) p. 203-208.

It is the objective of this paper to show that the effect of n-irradiation on the mechanical properties of $Fe_{40}Ni_{40}B_{20}$, is, in fact, controlled by both the state of relaxation of the amorphous structure and by the total fluence to which the specimens have been exposed. Furthermore, a model is suggested, of which, the radiation-induced changes in the ductility of the amorphous alloys, observed in this investigation and in the studies described here, can be rationalised coherently.

10227 **(HEDL—7420) Fractographic examination of HT-9 miniature compact tension specimens tested at low temperatures.** Gelles, D.S.; Huang, F.H. (Hanford Engineering Development Lab., Richland, WA (USA)). 1982. Contract AC06-76FF02170. 10p. NTIS, PC A02/MF A01. Order Number DE84004309.

Fractographic examinations have been performed on a series of miniature compact tension specimens of HT-9 tested at room temperature and below. Reductions in toughness found for these specimens are shown to be associated with transgranular cleavage fracture and are a function of the plastic deformation which occurs prior to the onset of brittle fracture.

10228 **(HEDL—7421) Swelling in several commercial alloys irradiated to very high neutron fluence.** Gelles, D.S.; Pintler, J.S. (Hanford Engineering Development Lab., Richland, WA (USA)). 1983. Contract AC06-76FF02170. 9p. NTIS, PC A02/MF A01. Order Number DE84005381.

Swelling values have been obtained from a set of commercial alloys irradiated in EBR-II to a peak fluence of 2.5 x 10^{23} n/cm² (E > 0.1 MeV) or ~ 125 dpa covering the range 400 to 650°C. The alloys can be ranked for swelling resistance from highest to lowest as follows: the martensitic and ferritic alloys, the niobium based alloys, the precipitation strengthened iron and nickel based alloys, the molybdenum alloys and the austenitic alloys.

10229 **(HEDL—7424) Effects of HFIR irradiation at 55°C on the microstructure and toughness of HT-9 and 9Cr-1Mo.** Gelles, D.S.; Hu, W.L.; Huang, F.H.; Johnson, G.D. (Hanford Engineering Development Lab., Richland, WA (USA)). 1983. Contract AC06-76FF02170. 15p. NTIS, PC A02/MF A01. Order Number DE84005382.

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Results are reported for base metal and weld metal specimens of HT-9 and Modified 9Cr-1Mo following irradiation in HFIR at 55°C to 5 dpa. The DBTT shifts in irradiated base metal specimens were 30°C for HT-9 and 90°C for 9Cr-1Mo with further shifts of 20°C for weld metal. Concurrently, strength as measured by hardness increased 15 percent for HT-9 and 25 percent for 9Cr-1Mo. The hardness increases can be attributed in part to defect cluster 1.5 to 3.0 nm in diameter at densities approaching 10^{17} cm^{-3} and also to lower rates of cavity nucleation ahead of the propagating crack.

10230 **(HEDL—7425) Evaluation of ferritic alloy Fe-2 1/4Cr-1Mo after neutron irradiation - irradiation creep and swelling.** Gelles, D.S.; Puigh, R.J. (Hanford Engineering Development Lab., Richland, WA (USA)). 1983. Contract AC06-76FF02170. 15p. NTIS, PC A02/MF A01. Order Number DE84004385.

Irradiation creep and swelling measurements are reported for Fe-2-1/4Cr-1Mo after irradiation by fast neutrons over the temperature range 390 to 560°C. diameter change measurements on thin walled pressurized tubes in a bainitic condition and density change measurements on rods in a nonstandard condition were made following irradiation in the Expaerimental Breeder Reactor II. The irradiation creep specimens were irradiated to a fluence of 5.7 x 10^{22} n/cm² (E > 0.1 MeV) or 30 dpa and the swelling specimens were irradiated to a peak fluence of 2.4 x 10^{23} n/cm² or 115 dpa. These results have been used as a basis to establish in-reactor creep and swelling correlations for 2-1/4Cr-1Mo in a bainitic condition. The correlations predict moderate swelling and moderate irradiation enhanced creep at 390°C.

10231 **(HEDL-SA—2905) Lithium shell effect and its impact on microscopy determinations of swelling behavior.** Yang, W.J.S.; Garner, F.A.; Kumar, A. (Hanford Engineering Development Lab., Richland, WA (USA)). Aug 1983. Contract AC06-76FF02170. 6p. (CONF-830942—73). NTIS, PC A02/MF A01. Order Number DE84004824.

From 3. topical meeting on fusion reactor materials; Albuquerque, NM, USA (19 Sep 1983).

The heterogeneity of swelling in some irradiated alloys arises from localized enhancement of void nucleation by the lithium shell effect near boron-rich precipitates. It has been found that these lithium-affected volumes can be discounted in microscopy determinations of the bulk-averaged swelling rate.

10232 **(HEDL-SA—3007-FP) Dependence on displacement rate of radiation-induced changes in microstructure and tensile properties of AISI 304 and 316.** Brager, H.R.; Blackburn, L.D.; Greenslade, D.L. (Hanford Engineering Development Lab., Richland, WA (USA)). Aug 1983. Contract AC06-76FF02170. 7p. (CONF-830942—74). NTIS, PC A02/MF A01. Order Number DE84004822.

From 3. topical meeting on fusion reactor materials; Albuquerque, NM, USA (19 Sep 1983).

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Annealed specimens of AISI 304 and 316 were irradiated in the EBR-II fast reactor at ~ 400°C over a range of neutron fluxes and energy spectra. Tensile tests show that the hardening of the AISI 304 is sensitive to the displacement rate while the hardening of AISI 316 is not. However, the microstructures of both AISI 304 and 316 are influenced by displacement rate. The increase in yield strength of the specimens is correlated with the contribution of the various microstructural components produced during irradiation. The insensitivity in the hardening of AISI 316 to displacement rate arises because the strengthening contribution from precipitates increases with displacement rate, whereas the strengthening contribution from voids decreases.

10233 **(INIS-mf—8653) Experimental study of praseodymium intermetallic compounds at low temperatures.** Greidanus, F.J.A.M. (Rijksuniversiteit Leiden (Netherlands)). 29 Sep 1982. 176p. NTIS (US Sales Only), PC A09/MF A01. Order Number DE83704748.

In this thesis the author studies the low temperature properties of praseodymium intermetallic compounds. In chapter 2 some of the techniques used for the experiments described in the subsequent chapters are discussed. A set-up to perform specific-heat experiments below 1 K and a technique for performing magnetic susceptibility measurments below 1 K, using a superconducting quantum interference device (SQUID) are described. Chapter 3 is devoted to the theory of interacting Pr^{3+} ions. Both bilinear and biquadratic interactions are dealt with in a molecular-field approximation. It is shown that first as well as second-order phase transitions

can occur, depending on the nature of the ground state, and on the ratio of magnetic to crystal-field interactions. In chapters 4, 5, 6 and 7 experimental results on the cubic Laves phase compounds $PrRh_2$, $PrIr_2$, $PrPt_2$, $PrRu_2$ and $PrNi_2$ are presented. From inelastic neutron scattering experiments the crystalline electric field parameters of the above compounds are determined. In chapters 5 and 6 susceptibility, neutron-diffraction, hyperfine specific-heat, low-field magnetization, pulsed-field magnetization, specific-heat and resistivity measurements are presented. In chapter 7 the specific heat and differential susceptibility of $PrNi_5$ below 1 K are studied. Finally, in chapter 8 praseodymium intermetallic compounds with low-symmetry singlet ground states, and cubic compounds with magnetic doublet ground states are studied.

10234 **(INIS-mf—8661) Enhanced nuclear magnetic resonance in a non-magnetic cubic doublet. A study performed with a ^{4}He-circulating dilution refrigerator.** Veenendaal, E.J. (Rijksuniversiteit Leiden (Netherlands)). 8 Dec 1982. 153p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704733.

In this thesis two lanthanide compounds are studied which show enhanced nuclear magnetism at low temperatures: Rb_2NaHoF_6 and $CsNaHoF_6$. Chapter II gives a description of the ^{4}He-circulating refrigerator, which was built to provide the low temperatures required for the polarization of the enhanced nuclear moments. This type of dilution refrigerator was chosen because of its simple design and large cooling power. Chapter III is devoted to a comparison of the different types of dilution refrigerators. A theoretical discussion is given of their performance, starting from the differential equations, which govern the temperature distribution in the refrigerator. In chapter IV the actual performance of the refrigerator, described in chapter II is discussed. In chapter V a description of the NMR-apparatus, developed for very-low-temperature NMR experiments is given. In chapter VI experimental results on the compound Rb_2NaHoF_6 are presented. The CEF-ground state of this compound is probably the non-magnetic doublet $GAMMA_3$, but at a temperature of 170 K a structural phase transition lowers the crystal symmetry from cubic to tetragonal and the doublet is split into two singlets. In chapter VII specific heat, (enhanced) nuclear magnetic resonance and magnetization measurements on the compound Cs_2NaHoF_6 are presented which also has a $GAMMA_3$-doublet ground state. In zero magnetic field the degeneracy of the doublet is removed at a temperature of 393 mK, where a phase transition is induced by quadrupolar interactions.

10235 (INIS-SU—186, pp 32-34) **Efficiency of radiation defect formation in n- and p-germanium doped with nickel and palladium.** Golubev, N.F.; Gut'ko, Z.I.; Latyshev, A.V.; Savenok, E.D. (Belorusskij Gosudarstvennyj Univ., Minsk). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

The effect of the impurity composition and the charge state of primary radiation-induced defects (RD) on defect formation processes under irradiation with gamma-quanta of ^{60}Co and 10 MeV electrons has been studied for n- and p-type Ge crystals with Sb, Ga, Ni and Pd impurities in different ratios by analysing temperature dependences of the Hall coefficient. The rate of charge carrier removal is found to depend on the impurity species and primary RD charge states that are determined by the Fermi level position (Esub(F)) during irradiation.

10236 (INIS-SU—186, pp 62-66) **Nature of radiation induced defects that cause the 0.52 ev IR absorption band in germanium.** Gerasimov, A.B.; Dolidze, N.D.; Ofengejm, G.L.; Tsertsvadze, A.A.; Cholokashvili, T.S. 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

A thorough examination is made of a radiation-induced defect that causes the 0.52 eV absorption band in the IR absorption spectrum of irradiated germanium. The n-type samples oriented in three principal crystallographic directions <111>, <110> and <100> were irradiated with 4 MeV electrons at T approximately 77 K. The measurements involved the monochromatic polarized lighting and uniaxial compression. The radiation-induced defect in question is demonstrated to have dichroism. However, as different from Si, dichroism is observable when no external pressure is applied. Upon application of the external uniaxial compression, the picture of dichroism remains substantially unchanged. Proceeding from the 0.52 eV band data on dichroism, the spacial orientation of the defect in question was determined. As a result of the data analysis, an assumption is made in analogy with silicon that the defect under cosideration should be a divacancy.

10237 (INIS-SU—186, pp 90-92) **Cascade collision simulation and point defect configuration in the intermetallic compounds.** Chudinov, V.G.; Gogolin, V.P.; Moseev, N.V.; Goshchitskij, B.N.; Protasov, V.I. (AN SSSR, Sverdlovsk. Inst. Fiziki Metallov). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

10238 (INIS-SU—186, pp 3-8) **Intermetallic compound structure and phase transformations in zirconium based alloys during the annealing and under irradiation with the electron pulsed beam.** Chekin, V.V.; Kirichenko, V.G.; Reznichenko, Eh.A.; Snurnikova, I.A.; Igrushin, V.V.; Tkach, Yu.V. 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

The techniques of the Moessbauer spectroscopy on ^{57}Fe nuclei and X-ray structural analysis are employed to get the insight into both the structure and α-phase composition of the alloys Zr-Fe and Zr-Fe-Me (Me=V, Cr, Nb, Ta, Sn, Mo) and the ambiance of Fe nuclei in those alloys. Investigated are the structural phase transformations during thermal annealing, under pulsed irradiation with fast electrons (energy 0.3-2 MeV, the pulse duration being 10 ns to 1 μs) and while laser-irradiation with the pulse duration 30 ns. The irradiation with pulsed electrons brings about such a rearrangement of the components in Zr-Fe-Nb and Zr-Fe which is close in nature to the one taking place during the thermal annealing of alloys. The laser irradiation yields the same results as the annealing.

10239 **(LBL—16550) Use of phase transformations in the design of alloy steel.** Morris, J.W. Jr. (Lawrence Berkeley Lab., CA (USA)). Jun 1983. Contract AC03-76SF00098. 20p. (CONF-8306165—1). NTIS, PC A02/MF A01. Order Number DE84003050.

From International conference on phase transformations in solids; Crete, Greece (27 Jun 1983).

This paper is intended to describe and illustrate the use of phase transformations in the design of new alloy steels. The general method of alloy design is described. Two examples are discussed: the development of new ferritic structural steels for use at cryogenic temperature, and the development of dual phase steels for automotive use.

10240 **(LBL—16573) Molecular surface science of heterogeneous catalysis. History and perspective.** Somorjai, G.A. (Lawrence Berkeley Lab., CA (USA)). Aug 1983. Contract AC03-76SF00098. 51p. (CONF-8308146—1). NTIS, PC A04/MF A01. Order Number DE84004634.

From 6. international summer institute conference in surface science (ISISS 1983); Milwaukee, WI, USA (22 Sep 1983).

A personal account is given of how the author became involved with modern surface science and how it was employed for studies of the chemistry of surfaces and heterogeneous catalysis. New techniques were developed for studying the properties of the surface monolayers: Auger electron spectroscopy, LEED, XPS, molecular beam surface scattering, etc. An apparatus was developed and used to study hydrocarbon conversion reactions on Pt, CO hydrogenation on Rh and Fe, and NH_3 synthesis on Fe. A model has been developed for the working Pt reforming catalyst. The three molecular ingredients that control catalytic properties are atomic surface structure, an active carbonaceous deposit, and the proper oxidation state of surface atoms. 40 references, 21 figures. (DLC)

10241 **(LBL—16681) Fatigue resistance and microstructure of experimental dual phase Fe/2Si/0.1C steel.** Dutta, V.B.; Suresh, S.; Thomas, G.; Ritchie, R.O. (Lawrence Berkeley Lab., CA (USA); Brown Univ., Providence, RI (USA). Dept. of Engineering). Sep 1983. Contract AC03-76SF00098. 16p. (CONF-8311130—1). NTIS, PC A02/MF A01. Order Number DE84004314.

From International conference on fracture prevention in energy and transport systems; Rio de Janeiro, Brazil (27 Nov 1983).

The fatigue behavior of an experimental dual phase Fe/2Si/0.1C steel has been examined as a function of constituent morphology with the objective of developing ferritic-martensitic microstructures with optimum strength and fatigue crack propagation resistance. Microstructure containing fine globular or coarse martensite within a coarse-grained ferritic matrix were found to show the highest fatigue threshold stress intensity range ΔK/sub o/ values reported to date (to our knowledge) and certainly the highest combination of strength and ΔK/sub o/ for steels (ΔK/sub o/ values above 19 MPa√m with yield strengths in excess of 600 MPa). Such unusually high crack growth resistance is attributed primarily to a meandering crack path morphology which promotes slower crack extension rates from crack deflection and roughness-induced crack closure mechanisms.

10242 **(NIIAR—12(527)) Service behaviour of 1Kh2M steel in steam generator of BOR-60 reactor.** Golovanov, V.N.; Shamardin, V.K.; Kondrat'ev, V.I.; Kryukov, F.N.; Chernobrovkin, Yu.V.; Bulanova, T.M.; Baj, V.F. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1982. 21p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704116.

Presented are the results from IX2M steel characteristics studies. This steel was used as the material for BOR-60 steam generator that has been operating in the steam generating mode during 18000 hs (35000 hs in sodium). It has been estimated that the basic criteria for this steel strength are its decarburization in sodium and corrosion resistance in steam and water under thermo-cyclic stresses. Based on the analysis of data with respect to the decarburization depth in sodium and corrosion damage in steam and water the conclusion has been drawn about both the successful application of IX2M steel as the steam generator material when its temperature is up to 470 deg C and the essentially longer life-service as compared to 18000 hs.

10243 **(NIIAR—41(556)) High temperature radiation-induced embrittlement of some alloys on refractory metal base.** Kazakov, V.A.; Smirnov, A.V.; Pokrovskij, A.S.; Chakin, V.P. (Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)). 1982. 23p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704117.

Presented are the results from studies of some vanadium-, niobium-, and molybdenum-based alloys mechanical properties and structure changes after the SM-2 and BOR-60 reactors irradiations by the fluences of up to 2.2×10^{23} n/cm² (E > 0.1 MeV) at 15-800 deg C. The high temperature radiation embrittlemenent of V-14% Nb and Nb-4.6% W-2.3% Mo - 1% Zr alloys has been observed. It has been found that such an embrittlement of V-14% Nb alioy is due to the formation of voids along the grain boundaries resulted in the intercrystalline failure at temperatures higher than 1000 deg C. The molybdenum-base alloy, Mo-Zr-B, didn't show any tendency to the high temperature radiation embrittlement. The coditions for the high temperature radiation embrittlement have been specified.

10244 (NUREG/CP—0045-Vol.2, pp 313-323) **High temperature ductility of austenitic alloys exposed to thermal neutrons.** Watanabe, K.; Kondo, T.; Ogawa, Y. (Japan Atomic Energy Research Inst., Ibaraki-ken). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Loss of high temperature ductility due to thermal neutron irradiation was examined by slow strain rate test in vacuum up to 1000°C. The results on two heats of Hastelloy alloy X with different boron contents were analyzed with respect to the influence of the temperatures of irradiation and tensile tests, neutron fluence and the associated helium production due to nuclear transmutation reaction. The loss of ductility was enhanced by increasing either temperature or neutron fluence. Simple extrapolations yielded the estimated threshold fluence and the end-of-life ductility values at 900 and 1000°C in case where the materials were used in near-core regions of VHTR. The observed relationship between Ni content and the ductility loss has suggested a potential utilization of Fe-based alloys for seathing of the neutron absorber materials.

10245 (NUREG/CP—0045-Vol.2, pp 324-333) **Effect of corroded surface layer on tensile properties of heat resisting alloys.** Fujioka, J.; Murase, H.; Nishiyama, Y. (Kawasaki Heavy Industries, Ltd., Akashi, Japan). 1982. NTIS, PC A18/MF A01 - GPO. (CONF-820650—Vol.2; BNL-NUREG—51674-Vol.2).

From 3. Japan/US HTGR safety technology seminar; Upton, NY, USA (2 Jun 1982).

Tensile properties of corroded specimens were compared to those of aged specimens at room and high temperatures on Hastelloy X, Incolony 800 and 800H. The effects of corrosion environments (air and HTR-B helium), corrosion time, temperature, and shape/size were noted. Tensile strength could be quantitatively expressed in terms of the intergranular oxidation, irrespective of the variation of materials and corroded conditions. Ratio of the intergranular oxidation in specimens with various shape/size combination was successfully arranged by using the term of specific surface area. From the results described above, change in the tensile strength of components due to corrosion for various shape/size combinations can be predicted in terms of the intergranular oxidation and the specific surface area.

10246 **(UCRL—89476) Corrosion test plan to guide canister material selection and design for a tuff repository.** McCright, R.D.; van Konynenburg, R.A.; Ballou, L.B. (Lawrence Livermore National Lab., CA (USA)). Nov 1983. Contract W-7405-ENG-48. 12p. (CONF-831174—58). NTIS, PC A02/MF A01. Order Number DE84004417.

From Materials Research Society annual meeting; Boston, MA, USA (14 Nov 1983).

Corrosion rates and the mode of corrosion attack form a most important basis for selection of canister materials and design of a nuclear waste package. Type 304L stainless steel was selected as the reference material for canister fabrication because of its generally excellent corrosion resistance in water, steam and air. However, 304L may be susceptible to localized and stress-assisted forms of corrosion under certain conditions. Alternative alloys are also investigated; these alloys were chosen because of their improved resistance to these forms of corrosion. The fabrication and welding processes, as well as the glass pouring operation for defense and commercial high-level wastes, may influence the susceptibility of the canister to localized and stress forms of corrosion. 12 references, 2 figures, 4 tables.

10247 **(UCRL—90093) Application of positron annihilation, electron paramagnetic resonance and thermogravimetric techniques to the study of uranium oxidation.** Colmenares, C.; Howell, R.H.; MacCrone, R.K.; Shatynski, S.R. (Lawrence Livermore National Lab., CA (USA); Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering). 1983. Contract W-7405-ENG-48. 19p. (CONF-8306161—1). NTIS, PC A02/MF A01. Order Number DE84004080.

From 9. international congress on metallic corrosion; Totonto, Canada (3 Jun 1983).

Thermogravimetric studies of the oxidation of uranium in water vapor, oxygen and air-water vapor environments have suggested that the oxidation process is controlled by oxygen interstitial-vacancy defect clusters. An interstitial-rich cluster of the type 2 (O/sub i/sup a/V/sub i/O/sub i/sup b/ (Willis cluster) has been postulated to control the oxidation of uranium in oxygen, water vapor, and the initial stage in air-water vapor, while a vacancy-rich defect cluster was proposed for the final oxidation stage in air-water vapor. Positron lifetime and Doppler broadening measurements exhibits features that were correlated with the reaction

conditions, thus confirming that different defects control the oxidation process. Further confirmation and identification of defects was obtained using the electron paramagnetic resonance technique.

10248 **Anisotropic critical fields in superconducting superlattices.** Banerjee, I.; Yang, Q.S.; Falco, C.M.; Schuller, I.K. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 5037-5040(1 Nov 1983).

The temperature and angular dependence of critical fields (H/sub c/) have been studied as a function of layer thickness for superconducting Nb/Cu superlattices. For layer thicknesses between 100 and 300 A, dimensional crossover has been observed in the temperature dependence of H/sub c/. Associated with the crossover we find a change in the angular dependence of H/sub c/ to that given by the effective-mass theory. This is the first time that a relationship has been found between dimensional crossover observed in the temperature dependence and that in the angular dependence of critical fields.

10249 **Spin correlations and reentrant spin-glass behavior in amorphous Fe-Mn alloys: Statics.** Aeppli, G.; Shapiro, S.M.; Birgeneau, R.J.; Chen, H.S. (Brookhaven National Laboratory, Upton, New York 11973, and Bell Laboratories, Murray Hill, New Jersey 07974). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 5160-5172(1 Nov 1983).

Neutron scattering studies have been performed on amorphous (Fe/sub 1-x/Mn/sub x/)$_{75}P_{16}B_6Al_3$ alloys for several concentrations x bracketing the spin-glass-ferromagnetic multicritical point found from magnetization measurements. The amorphous structure factor has been measured to 4.0 A^{-1}, and changes considerably for x near the multicritical concentration. For the most Mn-rich sample ($x = 0.35$), the small-angle scattering is well described by a single Lorentzian. The corresponding inverse ferromagnetic correlation length κ remains nonzero (less than 0.04 A^{-1}) at all temperatures. For $x = 0.32$, the Lorentzian scattering profile persists. As T is reduced, κ decreases to a value indistinguishable from zero and subsequently increases, as it should for a ferromagnet which evolves into a reentrant spin-glass. For progressively smaller x, the scattering function at low temperatures shows increasing deviations from the Lorentzian form, and instead is consistent with a power law Q/sup -alpha/ with $2<\alpha<3$. These results are very similar to those found in other alloy series which display both ferromagnetic and spin-glass behavior. We argue that this power-law form of the spin correlations in the reentrant phase provides an important clue to the nature of the ferromagnet—spin-glass transition and the reentrant state itself. This leads us to a detailed heuristic model for the phase diagram and phase-transition behavior, including the reentrant phenomenon. The model is based on a decomposition, via the frustration mechanism, of spin systems with exchange interactions of random sign, into spin-glass-like and ferromagnetic networks.

10250 **Calculation of the magnetic states of cobalt overlayers on copper (111).** Victora, R.H.; Falicov, L.M. (Materials and Molecular Research Division, Lawrence Berkeley Laboratory and Department of Physics, University of California, Berkeley, California 94720). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 5232-5242(1 Nov 1983).

One- and two-atom layers of cobalt on a copper (111) surface were found to be magnetic with a spin polarization close to the bulk value. The calculation was performed in a tight-binding scheme, with single-site, full orbital interactions treated self-consistently. Antiferromagnetic and ferrimagnetic states with a two-atom periodicity were examined. A new type of "spatially modulated" state was found. The density of states and the spatial distribution of magnetization were obtained for each configuration. The ferromagnetic state was found to have the lowest total energy; the energy of the spatially modulated state was, however, calculated to be only 0.03 Ry per surface atom higher. Agreement with photoemission experiments is satisfactory: It is excellent for a one-atom layer of Co on Cu (111), but a theoretically predicted shift in peak location with Co layer thickness is not found experimentally. Calculations for both pure Cu (111) and Co on Cu (111) show that the spectral features observed at the corner of the surface Brillouin zone arise from the totally symmetric electronic states.

10251 **Phase equilibria and kinetics in the solid state reaction between silicon and NiCrAl.** Hall, E.L.; Jackson, M.R.; Mehan, R.L. (General Electric Corporate Research and Development Center, P.O. Box 8, Schenectady, NY 12301). *Metallurgical Transactions,* [*Section*] *A: Physical Metallurgy and Materials Science;* **14A**: No. 8, 1549-1560(Aug 1983). Contract AC02-79ER10413.

The result of the solid state reaction of silicon with a model superalloy consisting of 70 at. pct Ni, 20 at. pct Cr, and 10 at. pct Al at 900°C is examined using light microscopy, electron microprobe analysis, and analytical electron microscopy. Extensive reaction is observed, with the formation of seven distinct reaction zones. The crystallography and chemistry of the phases present in each zon are determined using the analytical electron microscope. The reaction paths are described with reference to binary and ternary phase equilibrium diagrams. The kinetics of the reaction are presented. The nature and extent of the reaction are compared with previous experiments in which silicon carbide and reaction-bonded Si-SiC were reacted with the model superalloy.

10252 **A d-Band bonding theory of the relative heats of solution of transition metal alloys and its relationship to solubility limits.** Watson, R.E.; Bennett, L.H.; Goodman, D.A. (Brookhaven National Laboratory, Upton, NY 11973). *Acta Metallurgica;* **31**: No. 8, 1285-1292(Aug 1983). Contract AC02-76CH00016.

The relative heats of solution of a transition metal in another and vice versa are derived within a Friedel d-band bonding model. The trend found in the heats parallels the trend observed previously in the experimental relative solubilities. The implication of the solubility trend for surface segregation is also discussed.

10253 **Determination of Luders strains and flow properties in steels from hardness/microhardness tests.** Haggag, F.M.; Lucas, G.E. (Nuclear Safety Methods Division, EG & G Idaho, Inc., P.O. Box 1625, Idaho Falls, ID 83415). *Metallurgical Transactions,* [*Section*] *A: Physical Metallurgy and Materials Science;* **14A**: No. 8, 1607-1614(Aug 1983).

Development of radiation tolerant materials for use in fusion reactors requires testing of small volumes of candidate materials in high energy neutron irradiation facilities. As part of an effort to develop methods for extracting mechanical property information from small specimens, this study investigated techniques to characterize flow properties of steels exhibiting Luders strains from ball indentation hardness/microhardness tests. A quantitative relationship was found between the amount of pile-up formed during indentation and the magnitude of the Luders strain exhibited during tensile testing in SAE.1015 steel. Moreover, by nonlinear regression analysis, a single set of equations was found which correlated hardness data to the homogeneous true-stress-true-plastic strain relationship of steels in a variety of metallurgical conditions in the strain range 1 to 10 pct at room temperature.

10254 **Surface enrichment of nitrogen during passivation of a highly resistant stainless steel.** Lu, Y.C.; Bandy, R.; Clayton, C.R.; Newman, R.C. (Brookhaven National Laboratory, Upton, NY). *Journal of the Electrochemical Society;* **130**: No. 8, 1774-1775(Aug 1983).

Nitrogen, probably in an uncharged form, is enriched on the metal side of the metal film interface after passivation of the # 30 alloy. Molybdenum is probably present in the oxide film, but is depleted compared with the bulk alloy and shows no obvious association with nitrogen. The improvement of passivity by alloying with nitrogen probably results from segregation of nitrogen to the metal surface during preferential dissolution of metal atoms, rather than from its incorporation into an oxide film.

10255 **Formation and thermal stability of an oxide dispersion in a rapidly solidified Ti-Er alloy.** Konitzer, D.G.; Fraser, H.L.; Muddle, B.C. (Dept. of Metallurgy and the Materials Research Laboratory). *Scripta Metallurgica;* **17**: No. 7, 963-966(Jul 1983). Contract AC02-76ER01198.

There have been a number of reports concerning the strengthening of Ti alloys through the production of a fine dispersion of oxides. The oxides employed are usually those of Y and rare

earth elements such as Er, Nd and Ce, since it is expected that these phases will exhibit reasonable stability against coarsening during exposure at elevated temperatures. It is also important that a fine, uniform dispersion of oxides be produced, otherwise improvement in properties will not be realized. When conventional processing techniques are used in the fabrication of these materials, the resulting dispersions are, in general, coarse and rather inhomogeneous. A possible solution to this problem involves the application of rapid solidification processing (RSP), since refinement and increased homogeneity of microstructure are expected in material processed in this manner. Although the results of two such studies have demonstrated the potential for RSP in the production of a refined distribution of oxides, optimum dispersions have not yet been effected. In addition, it is necessary to determine the thermal stability of dispersions obtained using RSP, in order to assess the possible useful application of these alloys. In the present research program, attempts are being made to produce a refined dispersion of Er_2O_3 in Ti using RSP. Rapid solidification is effected by use of laser surface melting of a pre-cast binary Ti-Er alloy; the rapidly solidified, laser modified region is cut from the surface of the alloy sub-strate and used for subsequent experiments. Microstructural characterization is performed on samples in the as-solidified and heat treated conditions. This paper describes some preliminary results of this study, and demonstrates that thermally stable dispersions of Er_2O_3 can be produced using RSP.

10256 **Chromium substitution/conservation in alloys for use in energy systems.** McHargue, C.J. (Oak Ridge National Laboratory, Post Office Box X, Oak Ridge, TN 37830). *Journal of Metals;* **35**: No. 7, 30-35(Jul 1983).

This paper summarizes the conclusions of a panel of 11 scientists assembled by the U.S. Department of Energy to address the questions regarding our understanding of the scientific basis of chromium alloying additions and to identify the basic material science required to support future substitution/conservation programs. The state of knowledge of how chromium imparts desired properties is explored in the first five sections of this paper which covers the electronic structure of ferrous alloys and electronic structure of oxides, oxidation resistance, corrosion resistance, and mechanical properties. Some of the most promising candidate materials or novel processing techniques for potential new classes of materials are then discussed in sections on alloy design, high temperature alloys, surface alloying and modification, and structural ceramics.

10257 **Precipitation reactions during the heat treatment of ferritic steels.** Vitek, J.M.; Klueh, R.L. (Oak Ridge National Laboratory, Oak Ridge, TN 37830). *Metallurgical Transactions,* [*Section*] *A: Physical Metallurgy and Materials Science;* **14A**: 1047-1056(Jun 1983). Contract W-7405-ENG-26.

The precipitation reactions in two ferritic steels, 9Cr-1Mo-V-Nb and 12Cr-1Mo-V-W, were studied. Analytical electron microscopy, optical microscopy, electrolytic extractions, and hardness measurements were used to determine the types, amounts, and effects of precipitates formed as a function of the heat treatment. The effect of variations in the austenitizing treatment was ascertained. In addition to variations in the austenitizing time and temperature, different cooling rates after austenitization were also used. Air cooling after austenitization (normalization) resulted in little precipitation in both alloys. Precipitation in the 12Cr-1Mo-V-W alloy after furnace cooling was found in all cases examined. Under certain conditions precipitation was also found after furnace cooling the 9Cr-1Mo-V-Nb alloy. However, when compared to the amount of precipitate in the fully tempered state, the 9Cr-1Mo-V-Nb showed a much greater variation in the degree of precipitation following furnace cooling. In addition, the matrix microstructure of the 9Cr-1Mo-V-Nb alloy was very sensitive to cooling rate. The precipitation reactions during tempering after a normalizing treatment were followed as a function of tempering treatment. Tempering temperatures were varied from 400 to 780°C. The carbide precipitation was essentially complete after one hour at 650°C for both alloys. Analytical microscopy was used to identify the precipitates.

10258 **Retained austenite and tempered martensite embrittlement in medium carbon steels.** Sarikaya, M.; Jhingan, A.K.; Thomas, G. (Memorex Corporation, Santa Clara, CA). *Metallurgical Transactions,* [*Section*] *A: Physical Metallurgy and Materials Science;* **14A**: 1121-1134(Jun 1983). Contract AC03-76SF00098.

Electron microscopy, diffraction and microanalysis, X-ray diffraction, and auger spectroscopy have been used to study quenched and quenched and tempered 0.3 pct carbon low alloy steels. Some in sit fracture studies were also carried out in a high voltage electron microscope. Tempered martensite embrittlement (TME) is shown to arise primarily as a microstructural constraint associated with decomposition of interlath retained austenite into M_3C films upon tempering in the range of 250°C to 400°C. In addition, intralath Widmanstatten Fe_3C forms from epsilon carbide. The fracture is transgranular with respect to prior austenite. The situation is analogous to that in upper bainite This TME failure is different from temper embrittlement (TE) which occurs at higher tempering temperatures (approximately 500°C), and is not a microstructural effect but rather due to impurity segregation (principally sulfur in the present work) to prior austenite grain boundaries leading t intergranular fracture along those boundaries. Both failures can occur in the same steels, depending on the tempering conditions.

10259 **The effect of a molten nitrate salt environment on the mechanical properties of INCOLOY Alloy 800.** Goods, S.H. (Sandia National Laboratories, P.O. Box 969, Livermore, CA 94550). *Journal of Materials for Energy Systems;* **5**: No. 1, 28-35(Jun 1983). Contract AC04-76DP00789.

The influence of an oxidizing molten nitrate salt environment (60 pct $NaNO_3$-40 pct KNO_3) on the mechanical properties of INCOLOY Alloy 800 has been examined through a series of slow strain rate tensile tests. Fracture strain, reduction in area and ultimate tensile strength were monitored as parameters indicative of alloy susceptibility to environmental degradation. For strain rates between 2×10^{-7} sec^{-1} and 3.34×10^{-5} sec^{-1} no appreciable loss in ductility as measured by the above parameters was observed at 600°C relative to control specimens tested in air at the same strain rates and temperature. Similarly, the load-bearing capability of the alloy was unaffected by exposure to the environment. The structure of the oxide film formed by contact of the alloy with the molten salt was affected by the imposed continuous deformation. Deformation resulted in an oxide which was thicker than that formed on undeformed salt-exposed surfaces. While this difference in oxide thickness was a measurable phenomenon, the increased rate of oxidation was not great enough to alter appreciably alloy mechanical behavior in the salt compared to that measured in air over the time limits considered. In addition, fine subsurface cracks were observed in those oxides formed on deformed surfaces.

10260 **Concentration of europium(III) with supported liquid membrane containing a xylene solution of Di-2-ethylhexyl phosphoric acid.** Nishiki, T.; Bautista, R.G. (Ames Laboratory, USDOE). *Metallurgical Transactions,* [*Section*] *B: Process Metallurgy;* **14B**: No. 1, 25-32(Mar 1983). Contract W-7405-ENG-82.

The mechanism of europium transport through a supported liquid membrane is presented. The membrane consisted of a Teflon filter membrane with xylene solution of di-2-ethylhexyl phosphoric acid (HDEHP) as a mobile carrier held within the pores by capillary forces. Interposing the liquid membrane between two aqueous solutions of different pH, europium was transported and concentrated from the high pH solution to the low pH solution across the liquid membrane. The experiments were carried out to investigate the effects of the concentration of europium in the aqueous phase and HDEHP concentration in the membrane solution on permeation rates. The results have been compared with a transport model for concentrating europium across the liquid membrane. The permeation rates of europium can be explained approximately by the diffusion process of the complex formed between the europium ion and HDEHP at the membrane interface through the membrane in addition to the diffusion process of europium in the aqueous film adjacent to the membrane interface.

10261 **The oxidation-reduction kinetics of palladium powder.** Munir, Z.A.; Coombs, P.G. (University of California Davis, Davis, CA). *Metallurgical Transactions, [Section] B: Process Metallurgy;* 14B: No. 1, 95-100(Mar 1983). Contract W-7405-ENG-82.

The cyclic oxidation-reduction of submicrometer sized palladium powder was investigated over the temperature range 848 to 923 K. The total oxygen uptake decreased with increasing number of cycles as a consequence of sintering. Sintering was restricted to the reduction steps in these cycles. The relationships for the rate constants of the oxidation and reduction processes are, respectively, $(1.04)10^6 \exp(-(74.1)10^3/RT)$, and $(7.63)10^{13} \exp(-(207.9)10^3/RT)$. The activation energies for the oxidation of palladium powder and the reduction of palladium oxide are 74.1 and 207.9 kJ mol^{-1}, respectively.

10262 **Development of high performance superconductors by powder metallurgy.** Foner, S. (Francis Bitter National Magnet Laboratory and Plasma Fusion Center, Massachusetts Institute of Technology). *Progress in Powder Metallurgy;* 36: 107-114(May 1982).

In summary, powder metallurgy processed materials have a potential for alternative fabrication of a wide variety of novel structures which are not readily feasible with conventional metallurgical technologies. The processes discussed here require highly deformable initial powders with good quality control. We are interested in new and conventional commercial sources of such deformable powders for research and development of some of these novel structures.

10263 **Vortraege der Grossen Schweisstechnischen Tagung. (Papers of the annual welding conference).** Duesseldorf, Germany, F.R.; Deutscher Verband fuer Schweisstechnik e.V. (1981). 114p. (In German). (CONF-8109148—). Available from Deutscher Verband fuer Schweisstechnik e.V., Duesseldorf (Germany, F.R.).

From General meeting on welding engineering; Essen, F.R. Germany (16 Sep 1981).

Interest will be mainly focussed on structural welding in the fields of vehicle, power generating plant, railway bridge, reactor, tank and pipeline construction as well as energy transmission, energy production and space travel. Also under discussion will be such topical subjects as health and safety and the use of welding robots in the automobile industry, both these topics bearing direct relation to one another, at it is the labour-saving and health aspects which take precedence in both areas and to which medical experts are making valuable contributions to an ever increasing extent. (orig./IHOE).

3602 Ceramics, Cermets, And Refractories

REFER ALSO TO CITATION(S) 9473, 9493, 9493, 9511, 9954, 10354

10264 **(BARC—1153) Measurement of thermal conductivity of the oxide coating on autoclaved monel-400.** Dua, A.K.; George, V.C.; Agarwala, R.P. (Bhabha Atomic Research Centre, Bombay (India)). 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704183.

Thermal conductivity of the oxide coating on monel-400 has been measured by a direct method. The oxide coating is applied on an electrically conducting wire having stable characteristics. The wire is placed in a constant temperature bath and a constant direct current is passed through it. The wire gets heated and loses heat to the surroundings. Temperature is measured by considering it as a resistance thermometer. A convection heat transfer coefficient, which is difficult to measure experimentally but is involved in the analytical expression for thermal conductivity, is eliminated by connecting a second uncoated wire of a noble metal having similar surface finish as that of the coated wire in series with it. The accuracy of the method is nearly six percent. However, the method is not easily applicable for very thin (thickness $<= 1\mu$), highly porous coatings and materials having relatively large thermal conductivity.

10265 **(CONF-831174—32) X-ray line broadening studies on aluminum nitride, titanium carbide and titanium diboride modified by high pressure shock loading.** Morosin, B.; Graham, R.A. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 8p. NTIS, PC A02/MF A01. Order Number DE84003257.

From Materials Research Society annual meeting; Boston, MA, USA (14 Nov 1983).

Powders of AlN, TiC and TiB_2 have been subjected to controlled shock loading with peak pressures in the samples between 14 to 27 GPa and preserved for post-shock study. Broadened x-ray diffraction peak profiles are analyzed by a simplified method and show increases in residual lattice strain and small decreases in crystallite size. Strain values range from 10^{-5} to 10^{-4} for TiB_2 and to values larger than 10^{-3} for TiC and AlN.

10266 (DOE/ER—0113/2, pp 19-28) **Fabrication of lithium ceramics by hot pressing.** Wilson, C.N.; Hollenberg, G.W. Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

The purpose of this fabrication effort was to fabricate $LiAlO_2$, Li_2ZrO_3, Li_4SiO_4 and Li_2O pellets for incorporation into the FUBR irradiation experiment. Pellet specifications were set to meet the demanding requirements anticipated for future blanket designs. Pellets were successfully fabricated by hot pressing. Special procedures were developed to minimize moisture absorption and to remove impurities. Most pellet specifications were achieved. However, it was only possible to achieve the specified thermally stable grain size of less than 1 μm in $LiAlO_2$.

10267 (DOE/ER—0113/2, pp 43-50) **Radiation-induced RF loss measurements and thermal stress calculations for ceramic windows.** Fowler, J.D. Jr. (Los Alamos National Lab., NM). Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

Measurement of dielectric losses in RF window materials has been extended to include polycrystalline alumina and beryllium oxide. It was found that low doses resulted in degradation of the former material, and possibly of the latter. In addition, sapphire was irradiated at RTNS-II to compare neutron spectral effects with identical material irradiated earlier in the neutron source at the Los Alamos Meson Physics Facility (LAMPF). Significant differences were observed at higher frequencies, supporting the thesis that 14-MeV neutrons at a given fluence cause more damage than fission-spectrum neutrons. The capability for realistic calculations of thermal stresses resulting from RF losses has been developed and an example is shown.

10268 (DOE/ER—0113/2, pp 51-60) **Structural effects in neutron-irradiated low-activation ceramics.** Clinard, F.W. Jr. (Los Alamos National Lab., NM); Hurley, G.F.; Hobbs, L.W.; Rohr, D.L. Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

Samples of spinel (5 forms), Al_2O_3 (2), Si_3N_4 (1), and a SiC/graphite laminate were irradiated to $\sim 2 \times 10^{26}$ n/m^2 ($E > 0.1$ MeV) at 680 and 815 K, in an ongoing program to establish lifetimes of candidate low-activation ceramics. Swelling measurements of MgO Al_2O_3 showed excellent dimensional stability ($\Delta V/V \leqq 0.39\%$), and TEM examination revealed a damage microstructure consisting of a dense array of interstitial dislocation loops. MgO $2Al_2O_3$ exhibited greater swelling ($\leqq 0.91$ vol%) than did the 1:1 spinel, but dimensional stability was still good. Al_2O_3 swelled ~ 3.4 vol%; this value is slightly less than that at higher temperatures, and in combination with reduced swelling anisotropy should result in an improved lifetime. Swelling of Si_3N_4 was ~ 1 vol%, similar to that observed at higher temperatures. The SiC/graphite composite showed almost complete delamination as a result of 1.47 vol% swelling of the SiC and ~ 7 vol% compaction of the graphite. This result points to a serious potential difficulty with differential swelling in laminated systems intended for use in a radiation environment.

10269 (FEI—1270) Stability of irradiated boron carbide under isothermal annealing conditions. Klimov, V.D.; Tarasikov, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1982. 11p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704539.

The results of the study of swelling kinetics of irradiated boron carbide under conditions of isothermal annealings are presented in the paper. It is shown that an intensive swelling is observed at temperatures higher than 1100 deg C. The value of swelling depeneds on the annealing temperature and the degree of boron burnup. Helium located in the technological pores diffuses intensively from the sample along the grain boundaries.

10270 (FEI—1286) Stability of boron carbide crystal structure under irradition using fast reactor spectrum. Alekseev, Yu.V.; Klimov, V.D.; Tarasikov, V.P. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.). 1982. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704115.

Using the methods of X-ray analysis effect of irradiation in fast reactor on crystal structure of boron carbide in the temperature range of 320-700 deg C and 1-6% burnup of boron total is analyzed. To study thermal stability of defects formed under irradiation postradiational isochronous annealing in the range. T°=300-1500 deg C has been carried out. It is shown that irradiation results in distortions of boron carbide crystal structure, which is expressed in the change of unit cell parameters, appearing of diffusion scattering, broadening of diffraction maxima. On the basis of the results obtained a conclusion is made on the type of defects, their evolution in the process of irradiation and annealing.

10271 (LA-UR—83-3717) Development of the VLS process for SiC whisker growth. Hurley, G.F. (Los Alamos National Lab., NM (USA)). 1984. Contract W-7405-ENG-36. 20p. (CONF-840136—1). NTIS, PC A02/MF A01. Order Number DE84004376.

From 6. annual discontinuously reinforced metal matrix composite coordination working group meeting; Park City, UT, USA (4 Jan 1984).

Portions are illegible in microfiche products.

Our whisker work involves preparation of whisker samples, whisker characterization, and process scaleup. Sample whiskers are used for composite preparation and for whisker characterization work, while modelling of the production process is itself proving useful. The approach to scaleup recognizes the importance of a full understanding of the process variables. Hence our work in this area is proceeding with studies of the chemistry of the process gases and investigation of the growth mechanism.

10272 Site-selective excitation of U^{4+} diluted in incommensurate $ThBr_4$. Delamoye, P.; Krupa, J.C.; Conway, J.G.; Edelstein, N. (Laboratoire de Radiochimie, Institute de Physique Nucleaire, Universite de ParisSud, Bote Postale 1, F-91406 Orsay, France). *Physical Review [Section] B: Condensed Matter;* **28**: No. 9, 4913-4922(1 Nov 1983).

Selective-excitation experiments in the visible region are reported for the U^{4+}:$ThBr_4$ system. These permit the classification of absorption and emission lines to the sites found in the incommensurately modulated structure of $ThBr_4$. The lines are assigned to a D/sub 2d/ (B) site, a continuous distribution of D_2 (C) sites, and to the limiting D_2 (A) site. By application of the model of Delamoye and Currat [J. Phys. (Paris) Lett. 43, L655 (1982)], the energy levels have been mapped as a function of the phase angle phi/sub l/ of the distortion. The agreement between the predictions of the model and experiment is very good. It is shown that the incommensurate structure of $ThBr_4$ must be of higher order than q/sub s//c(= (4/13) (where q/sub s/ is a modulation wave vector and c(is one of the basis vectors of the reciprocal lattice of the tetragonal unit cell).

10273 Parametric analysis of the energy levels of U^{4+} in D/sub 2d/ and limiting D_2 sites in incommensurate $ThBr_4$. Delamoye, P.; Rajnak, K.; Genet, M.; Edelstein, N. (Laboratoire de Radiochimie, Institute de Physique Nucleaire, Bote Postale No. 1, F-91406 Orsay, France). *Physical Review [Section] B: Condensed Matter;* **28**: No. 9, 4923-4930(1 Nov 1983).

Below T/sub c/ = 95 K, U^{4+}:$ThBr_4$ exists as an incommensurately modulated structure. The U^{4+} ions occupy a range of sites which vary from D/sub 2d/ to a limiting D_2 site. The D/sub 2d/ and limiting D_2 sites have been identifed spectroscopically. We report a parametric analysis of the U^{4+} energy levels in both sites. For 26 levels in the D/sub 2d/ site the root-mean-square deviation σ = 36 cm^{-1} and F^2 = 42 253 +- 127, F^4 = 40 458 +- 489, F^6 = 25 881 +- 383, zeta = 1783 +- 7, α = 31 +- 1, β = -644 +- 75, γ = 1200, $B_0{}^2$ = -1096 +- 80, $B_0{}^4$ = 1316 +- 146, $B_4{}^4$ = -2230 +- 85, $B_0{}^6$ = -3170 +- 379, and $B_4{}^6$ = 686 +- 246, all in cm^{-1}. For 38 D_2 levels σ = 39 cm^{-1}, and those parameters which occur in both symmetries are only slightly changed. The additional parameters which occur only in D_2 symmetry are $B_2{}^2$ = -78 +- 30, $B_2{}^4$ = 318 +- 122, $B_2{}^6$ = 136 +- 101, $B_6{}^6$ = 123 +- 125, all in cm^{-1}. F^2 is 81% of the free-ion value. This decrease in F^2 is more like that found for 3d than that found for 4f electrons.

10274 Paramagnetic resonance of Gd^{3+} as a probe of exchange and crystal-field effects in rare-earth-metal pnictides: Antiferromagnetic and diluted materials. Sugawara, K.; Huang, C.Y.; Cooper, B.R. (Department of Physics, Case Western Reserve University, Cleveland, Ohio 44106). *Physical Review [Section] B: Condensed Matter;* **28**: No. 9, 4955-4962(1 Nov 1983).

We have extended the previous study of electron paramagnetic resonance (EPR) of dilute Gd^{3+} impurities in Van Vleck paramagnets to study related antiferromagnetic compounds. The host systems studied are the terbium monopnictides and the cerium monopnictides. We have studied both pure host systems and systems with the host rare-earth metal diluted with yttrium. Since the Gd^{3+} EPR linewidths are often substantial compared to the resonance field, we have included the antiresonance (negative-frequency) effect in the analysis. The Gd^{3+} resonance g factor serves to probe the host susceptibility. Of particular interest in this regard is the g-factor behavior for TbP as the host system. This agrees quite closely with the superconducting quantum interference device magnetometer susceptibility behavior (i.e., in extremely small magnetic field) found by Koetzler et al., showing that the EPR g factor obtained indeed measures the linear response of the host system. This effect should be useful for studying systems such as CeSb where the apparent susceptibility, as conventionally measured, is likely to include substantial nonlinear contributions. The linewidth behavior is complex. Fluctuation effects among host crystal-field levels sometimes dominate, and this allows the host crystal-field splitting to be determined.

10275 Influence of strain on the coexistence state of ferromagnetic superconductors. Tachiki, M.; Dunlap, B.D.; Crabtree, G.W. (Materials Science and Technology Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review [Section] B: Condensed Matter;* **28**: No. 9, 5342-5344(1 Nov 1983). Contract W-31-109-ENG-38.

The coexistence of sinusoidal magnetic order and ferromagnetism in the superconducting phase of $ErRh_4B_4$ is explained by the existence of an inhomogeneous strain which locally creates additional magnetocrystalline anisotropy, enhancing the ferromagnetic-phase-transition temperature more than the superconducting-sinusoidal-phase-transition temperature.

10276 Thermoluminescence of X-irradiated CaO and CaO:Li single crystals. Orera, V.M.; Rodriguez, V.D.; Alcala, R. (Zaragoza Univ. (Spain). Facultad da Ciencias); Chen, Y. (Oak Ridge National Lab., TN (USA)). *Physica Status Solidi [Sectio] A: Applied Research;* **77**: No. 2, 625-631(16 Jun 1983).

Thermoluminescence measurements of 80 K X-irradiated CaO and CaO:Li single crystals are reported. In pure CaO five glow peaks at 105, 130, 175, 205, and 275 K are associated with the

thermal release of holes from different traps. All these peaks show a main emission band at 610 nm which coincides with the main band observed in the X-ray induced emission spectra. A band at 260 nm is observed only in a glow peak at 190 K and is tentatively assigned to the release of electrons with subsequent recombination with V-type centers. In CaO:Li, besides the emission bands at 260 and 610 nm, a new band at 330 nm is observed. Two glow peaks at 130 and 200 K, which show emission bands at 330 and 610 nm, are associated with the release of holes. The peak at 200 K is due to the thermal annihilation of $[Li]^0$ centers. The activation energies for thermal ionization of the traps, which are related with the main glow peaks are also given.

10277 **Raman spectral characterization of silicon carbide nuclear fuel coatings.** Krautwasser, P.; Angelini, P.; Begun, G.M. (Metals and Ceramics Division and Chemistry Division, Oak Ridge National Laboratory, Oak Ridge, Tennessee 37830). *Journal of the American Ceramic Society;* **66**: No. 6, 424-433(Jun 1983). Contract W-7405-ENG-26.

Raman spectral observations were used to characterize the vapor-deposited SiC coatings on the microspheres used for fuels in high-temperature gas-cooled reactors. Good correlation was found between this nondestructive optical method and other characterization data. The SiC coatings, derived from methyltrichlorosilane, contained excess silicon or excess carbon, depending on deposition temperature, coating rate, and carrier gas used. Heat treatment of nonstoichiometric SiC resulted in many cases in the development of an outer layer of carbon. Fast-neutron irradiation produced marked effects on the spectral properties of the coatings. Recovery of materials properties on thermal annealing was studied.

10278 **Sustained UO_2 melts using the inductive ring susceptor technique.** Copus, E.R. (Sandia National Laboratories, Albuquerque, NM). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **79**: No. 225, 310-313(1983).

A method for melting and sustaining large volumes of UO_2 has been developed. The method, known as the Inductive Ring Susceptor Technique, melts UO_2 powder via inductively heated refractory metal rings. The technique has been fully demonstrated by a series of experiments which melted 5-15 kg charges of powdered SiO_2, Al_2O_3, and UO_2.

10279 **Diffusion behavior in titanium-chromium hydrides.** Bowman, R.C.; Attalla, A.; Craft, B.D.; Johnson, J.R. (Monsanto Research Corporation-Mound, Miamisburg, OH). *International Journal of Hydrogen Energy;* **8**: No. 10, 801-808(1983). Contract AC04-76DP00053.

NMR measurements of the proton relaxation times T_1, T / SUB 1p/ , and T_2 have been performed on the low (i.e. α-phase) and intermediate (i.e. α-phase) hydrogen concentrations in CO-stabilized $TiCr_2H$ /SUB x/ with both the hexagonal (C14) and cubic (C15) Laves structures. The relaxation times indicate rapid proton diffusion above 200 K for all the $TiCr_2H$ /SUB x/ phases; however, large differences in the diffusion activation energies are observed. This behavior is structure sensitive and has been associated with variations between interstitial site occupancies and diffusion pathways for the C15 and C14 structures. The estimated 300 K diffusion constants in the α-phase of $TiCr_2H$ /SUB x/ are comparable to the literature values for HfV_2H_2, $LaNi_5H_7$ and PdH /SUB 3/4/ but are orders of magnitude larger than the proton diffusion constant in $TiFeH_1$.

10280 **Dissolution studies of $CsA1Si_5O_{12}$.** Vance, E.R.; Ahmad, F.J. (Materials Research Laboratory, Pennsylvania State University, University Park, Pennsylvania). *Nuclear and Chemical Waste Management;* **4**: No. Z, 171-176(1983). Contract AC09-79ET41900.

$CsAlSi_5O_{12}$ was exposed to a variety of aqueous media, with most of the experiments being conducted at 70 °C. The Cs extraction was approximately proportional to the square root of the dissolution time. As found previously at 25 °C the Cs extraction at 70 °C varied as (H^+) /SUP 1/4/ in the pH = 1-4 range and increased with increasing alkalinity beyond pH = 7. No substantial change in the Cs dissolution rate at neutral pH was found in 1 μ $CaCl_2$, as against deionized water, a possible slight increase was observed in 0.01 μ $NaHCO_3$ relative to KOH of about the same pH, and a six-fold increase was observed at neutral pH in 1 μ NaCl relative to deionized water. The dissolution rate increased by a factor of about 10 on heating from 25 to 70-100 °C, but not with further increase of temperature. The Cs dissolution rate of Cs-loaded Na mordenite which was rendered X-ray amorphous by subsolidus heating at 1000 °C was found to be about 1 $g.m^{-2}.day^{-1}$ in a Soxhlet test.

10281 **Siliciumcarbid T. 3. (Silicon carbide Pt. 3. Hot-pressed silicon carbide as construction material).** Lipp, A. (Elektroschmelzwerk Kempten G.m.b.H., Muenchen (Germany, F.R.)). Bad Honnef, Germany, F.R.; Deutsche Keramische Gesellscahft e.V. (1980). 27p. (In German). Available from Deutsche Keramische Gesellschaft e.V., Bad Honnef (Germany, F.R.).

The main objective of the DKG-Working Group "Special ceramic materials" was to relate the identified properties of specially manufacutred SiC-bodies to their mode of construction. In the third part of the report presented here a hot-pressed silicon carbide material, already long in use in the trade and which can therefore be considered a tested and commercial product, was manufactured and investigated. A variation of the parameters was not carried out. Silicon carbide was set in the α-modification and aluminium was used as a sintering aid. Following the characterisation of the product the results of measurements taken are explained and discussed. Well-established procedures were applied for testing properties of the material. (orig./IHOE).

3603 Composite Materials

REFER ALSO TO CITATION(S) 10271

10282 (DOE/ER—0113/2, pp 61-78) **Comparison of cryogenic neutron and gamma irradiation effects in organic insulators at low dose.** Hurley, G.F.; Fowler, J.D. Jr. (Los Alamos National Lab., NM). Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

Neutron irradiation of organic insulators at liquid helium temperature to 1.52 x 10^{21} n/m^2, E > 0.1 MeV, results in small but significant changes in electrical and mechanical properties for some of the materials investigated here, and no change for others. Mechanical properties change in a way not inconsistent with, but somewhat different than, gamma-induced alterations, while some electrical properties seem to undergo small changes at lower doses than in comparable gamma studies. A major difference in the response to be anticipated from these materials to higher dose gamma or neutron irradiation is a sensitivity to the hydrogen composition in neutron irradiations. Since hydrogen content among the materials being investigated is lowest in those materials previously found best to withstand gamma irradiation, response to neutron irradiation may be even more widely separated, among these materials, at the same fast-neutron dose.

10283 (DOE/ER—0113/2, pp 79-90) **Debonding of epoxy from glass in irradiated laminates.** Klabunde, C.E.; Coltman, R.R. Jr. (Oak Ridge National Lab. TN). Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

Glass-fabric-filled epoxies irradiated at 4.7 K and examined at room temperature by 20x stereomicroscopy showed an internal flaw structure which increasingly filled the sample as the gamma-ray dose was increased. These flaws were determined to be areas where the plastic had debonded from the glass fibers. The extent of this process correlated well with the dose-dependent loss of mechanical strength. Evidence is reported for a similar mechanism in polyimides although visible flaws have not yet been produced. Possible mechanisms for debonding are suggested. New experiments are also suggested to further clarify the failure mechanism.

10284 (DOE/ER—0113/2, pp 91-98) **Strength of G-10CR and G-11CR epoxies after irradiation at 5 K by gamma rays.** Coltman, R.R. Jr.; Klabunde, C.E. (Oak Ridge National Lab. TN). Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

New data from three gamma-ray irradiations at 5 K are combined with previous results to provide complete curves of flexural and compressive strength versus dose for G-10CR and G-11CR glass-fabric-filled epoxies. Tests were made at 77 K following warm-up to 307 K. The doses required to produce 25% losses in strength were 2.1 MGy in flexure and 3.0 MGy in compression for G-10CR and 3.7 MGy for flexure and compression in G-11CR. An accompanying ^{10}B fission fragment dose in G-10CR had little effect upon flexure strength.

3604 Polymers And Plastics

REFER ALSO TO CITATION(S) 9384, 9385, 9393, 9394, 9395, 9396, 9397, 9398, 9399, 9401

10285 **(AD-A—133050/5) Spectroscopic characterization of the cured state of acetylene-terminated resin. Final report 1 Apr 1982-31 Mar 1983.** Koenig, J.L. (Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Macromolecular Science). Aug 1983. 70p. NTIS, PC A04/MF A01.

The acetylene-terminated resin, bis 4-(3-ethynylphenoxy)phenyl sulfone (AT) has been studied using Fourier transform infrared spectroscopy (FT-IR) and high resolution nuclear magnetic resonance spectroscopy of solids. Samples which were cured at different temperatures for various times were analyzed by FT-IR and the results interpreted using factor analysis. The analysis revealed that only two major components were involved in the curing mechanism, that is, only a single polymerization reaction occurred at low curing temperatures. The pure component spectra generated by the factor analysis procedure could be used to analyze the state of cure of the resin. The infrared spectrum of the polymer is consistent with a polydiene structure. The NMR results produced a similar structural result. The extent of cure of the AT resin as evidence by the disappearance of the acetylene carbon followed a similar path to the infrared results. Curve studies also focussed on the effect of high temperature post cures of the ATS resin. Structural changes were reflected by spectroscopic differences but the changes were small and precise assignments were not possible. Further model compound studies would allow a precise determination of the structural basis of these spectroscopic differences.

10286 **(AERE-M—3251(rev.)) Radiation stability of plastics and rubbers.** Hitchon, J.W. (UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.). Jan 1983. 8p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704538.

Physical radiation effects of β particles, γ-radiation, x rays and accelerated electrons on thermosets, thermoplastics and rubbers are charted. Modifications to the information due to composition, shape and environment are noted.

10287 **Structural basis of mechanical properties of polyethylenes.** Crist, B.; Carr, S.H. pp 253-260 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

Model polyethylenes having uniform molecular weights and well defined amounts of short chain and long chain branching were investigated for tensile and fracture properties. The tensile elastic modulus E is independent of molecular weight and/or branching, being determined only by density or crystallinity. The chemical structure of the polyethylene strongly influences the mechanical response at high strain. The critical molecular weight for the attainment of high ductility is increased by both short and long chain branching. Broadening the molecular weight distribution by adding smaller chains decreases the rate of work hardening. Fracture properties were measured with single edge notched specimens. The J-Integral method appears best suited for measuring fracture toughness in ductile polyethylene. The toughness J/sub Ic/is seen to increase from 18 KJ/m^2 to 45 KJ/m^2 over the molecular weight range where tensile ductility is developed. 10 references, 6 figures, 2 tables.

3606 Other Materials

REFER ALSO TO CITATION(S) 9458, 9459, 9484, 9494, 9501, 9594, 9597, 9598, 9624, 9624, 9629, 9801, 9802, 11147, 11152, 11160

10288 **(AERE-R—10613) Cementitious materials for the encapsulation of radioactive wastes. Paper 1: cement production and cement hydration.** Pearson, D. (UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.). Feb 1983. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704587.

The paper introduces the production of cement, cement terminology and the reactions which occur during hydration. Some methods of investigating the hydration reactions are presented and several theories for hydration mechanisms are discussed. Finally, some practical considerations for workers using cement in the radwaste field are noted.

10289 **(BNL—34070) Use of optical emission spectroscopy as a diagnostic technique for plasma deposition of hydrogenated amorphous silicon and carbon.** Kampas, F.J. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 7p. (CONF-831174—60). NTIS, PC A02/MF A01. Order Number DE84005094.

From Materials Research Society annual meeting; Boston, MA, USA (14 Nov 1983).

Optical emission intensities have been measured as a function of composition for silane-argon and silane-hydrogen mixtures used in the deposition of hydrogenated amorphous silicon. It was found that changes in silane fraction have a large effect on the electron oncentration and energy distribution in the discharge.

10290 **(CEA-CONF—6725) Radiation response of optical fibers and photodiode components with a view to nuclear data links.** Breuze, G.; Carnet, B.; Gadrault, R.; Le Meur, R.; Pelras, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 17p. (In French). (CONF-830580—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750271.

From PHOTON '83 - international conference on exhibition on optical fibers and their applicances; Paris, France (16 May 1983).

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The effect of cobalt-60 gamma rays on optical fibers and optical components has been studied by CEA and THOMSON-CSF Co. A specific gamma facility was designed for fibers to use as nuclear data links. The gamma-ray exposure rate is from 200 R/h to 2000000 R/h. The volume of the irradiation chamber is 0.04 cubic meter. The device was built for continuous or discontinuous measurements. Optical power is followed for glass fiber, silica fiber (with either Ge-doped SiO_2 core, or F-doped SiO_2 cladding) and for polymer clad silica fiber. The PCS fiber is the most radiation resistant: 4 dB/km with dose 10^5rad, dose rate 2 x 10^4 rad/hour at wavelength of 850 nm ambient temperature. 80 commercial optical components LEDS's and PIN photodiodes are tested under gamma radiation. The radiation-induced optical losses are very small e.g.5 dB with 4 x 10^6 rads for standard PIN and 3.5 dB with rod-type, which includes a step index fiber.

10291 **(CEA-CONF—6727) Gamma irradiation up to 10^9 rads of all silica fibers, comparison with polymer clad silica fibers and solid sample between 0.4 and 2.5 micrometers.** Boisde, G.; Bonnejean, C.; Perez, J.J.; Neumann, V.; Wurier, B.; Boucher, D. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1983. 8p. (In French). (CONF-830580—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750272.

From PHOTON '83 - international conference on exhibition on optical fibers and their applicances; Paris, France (16 May 1983).

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The effect of γ radiation (Co^{60}) on optical fibers is studied for investigations to remote measurement in irradiating environments. The spectral characteristics of PCS and AS silica fibers, PCS "Wet" and AS "wet" and "superwet" are compared. An automatic computerized system for measurement "in situ" is used between 0,4 AND 1,1 micron. Radiation-induced effects are examined at 840nm on PCS, AS with silicone, AS with epoxy (200 and 400/600μm) up to 5.10^8 rads. Samples of "dry", "wet", "superwet" and "doped fluor" silica are studied up to $1,3.10^9$ rads between 0,3 and 2,5 μm. The photobleaching, the radiation hardening and the breakeage of PCS and AS-silicone after 10^7 rads are recognized. The spectral characteristics of a band at 610-630nm, a spectral deformation at 945nm for "wet" fibers and a peak of the radiation-induced attenuation are observed. The kinetic of the 630nm defect in silica fibers and silica samples is also investigated.

10292 (DOE/ER/10934—T1) Theoretical and experimental study of solid phase miscibility gaps in III/V quaternary alloys. Progress report. Stringfellow, G.B. (Utah Univ., Salt Lake City (USA)). 1 Nov 1983. Contract AT03-81ER10934. 52p. NTIS, PC A04/MF A01. Order Number DE84004391.

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$GaAs_{0.5}Sb_{0.5}$ alloys were grown at 600 and 630°C in the middle of the solid immiscibility range, using the organometallic vapor phase epitaxial growth technique. The surface morphology is excellent, and the photoluminescence spectra are typical of the III/V alloy semiconductors. (DLC)

10293 (IAE—3549/10) Low-temperature calorimeter for measuring heat capacity in magnetic fields up to 20 T. Khlopkin, M.N.; Chernoplekov, N.A.; Cheremnykh, P.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1982. 16p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704184.

A calorimeter for absolute measurement of heat capacity of superconductors in the temperature range of 2-40 K in magnetic fields of up to 20 T designed for operation both in laboratory superconducting solenoids and in the KS-250 combined magnetic system has been developed. Heat capacity of 0.5-10 g specimens is measured by a quasidiabatic method with discrete heat intake. Discontinued heat contact is accomplished with heat-exchange gas pumped-out with an inner sorption pump. Temperature is measured with a carbon resistance thermometer, correction for its resistance change an a magnetic field considering. Working volume of the calorimeter is surrounded with a high-pure aluminium screen cooled to helium temperature, which ensures considerable weakening of magnetic field pulsations and decreases undesirable heating of a specimen with Foucault currents. Heat capacity of pure copper specimen was measured and measurement error was evaluated, which doesn't exceed 1% when operating in a superconducting solenoid and 2% when operating in the combined magnetic system. Results of measurements of V_3Ga superconductor heat capacity in magnetic fields of up to 20 T are given.

10294 (INIS-mf—8282) Electron density distribution in α-oxalic acid dihydrate. An X-ray and neutron scattering investigation at low temperatures. Feld, R.H. (Marburg Univ. (Germany, F.R.). Fachbereich Geowissenschaften). 15 Feb 1980. 235p. (In German). NTIS (US Sales Only), PC A11/MF A01. Order Number DE83704730.

To test the quality of single crystal measurements and methods of electron density determinations Bragg intensities at α-oxalic acid dihydrate were recorded in 3 neutron and one X-ray single crystal measurement at 100 K. In addition a neutron single crystal measurement was carried out at 75 K and a neutron powder spectrum was measured at 100 K. The neutron measurements which were carried out under different scattering conditions after correction delivered parameters which allowed to reproduce the deformation densities very good. The electron density distribution was described by its separation into inner and valence electrons by means of multipole functions and charge clouds. The multipole functions better described the ionic character of bonds by allowing a clear determination of atom charge within the mistake of the structure model. The charge cloud model indeed allows no clear assignment of electron density to an atom but it describes a covalent bonding behaviour.

10295 (INIS-SU—186, pp 22-24) Radiation defects in electron irradiated narrow gap semiconductors Hgsub(1-x)Cdsub(x)Te. Vojtsekhovskij, A.V.; Lilenko, Yu.V. (Tomskij Gosudarstvennyj Univ. (USSR). Sibirskij Fiziko-Tekhnicheskij Inst.). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

The characteristic properties of defect formation in electron irradiated (2-5 MeV) mercury-cadmium telluride crystals in the temperature range 8-300 K are examined. It is found that the rate of formation of the radiation defects (RD) responsible for the electrical properties of the crystals sharply decreases as the irradiation temperature rises. The defect formation rate is found to be independent of the initial crystal properties. Data of isochronous annealing in the temperature range 10-450 K for the crystals irradiated at different temperatures are used for the interpretation of RD properties. The supposition about the formation of interstitial-vacancy pairs in the Hgsub(1-x)Cdsub(x)Te crystals irradiated at T=8 K is made. At an irradiation temperature of 80 K the formation of interstitial-vacancy complexes with impurity atoms and initial defects of the crystal is possible. For the crystals irradiated at 300 K the formation of cluster-type defects is supposed to occur.

10296 (INIS-SU—186, pp 73-75) Thermally stimulated thermoelectrical and thermomagnetic currents in dielectrics. Andryushchenko, A.V.; Kovalev, S.E.; Panova, A.N. (Vsesoyuznyj Nauchno-Issledovatel'skij Inst. Monokristallov, Stsintilyatsionnykh Materialov i Osobo Chistykh Veshestv, Kharkov (Ukrainian SSR)). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

10297 (LBL—16778) Reversible intercalation of graphite by fluorine and related synthetic and thermodynamic studies. Mallouk, T.E. (Lawrence Berkeley Lab., CA (USA)). Jul 1983. Contract AC03-76SF00098. 163p. NTIS, PC A08/MF A01. Order Number DE84004315.

Portions are illegible in microfiche products; Thesis.

The pentafluorogermanate salts of a variety of cations (ClO_2^+, NO^+, SF_3^+, NO_2^+, and XeF_5^+) were synthesized and characterized by x-ray crystallographic and vibrational methods. The pentafluorogermanate ion was found to exist in one monomeric and at least three polymeric modifications in its salts. Lattice energy calculations and vapor pressure/temperature measurements established the following gas phase fluoride ion affinities: GeF_4, 100(6); BF_3, 92(6); AsF_5, 115(7); XeF_5^+, 202(7); ClF_2^+, 223(7); SF_3^+, 211(7); IF_6^+, 211(7) kcal $mole^{-1}$. The electron affinities of the third row transition metal hexafluorides were likewise re-evaluated. The new graphite bifluorides, $C_{12}^+HF_2^-$ and $C_{18}^+HF_2^-$, were prepared; their crystal structures establish that they are correctly formulated as graphite salts. Fluorination of graphite in the presence of HF produced these salts and the first-stage hydrofluorides C/sub x/F/sub 1-δ/(HF)/sub δ/ ($5 > x > 2$, $x/\delta \simeq 12$), which were studied by XPS, NMR, vibrational spectroscopy, and crystallographic methods. In these compounds, fluorine forms weak, semi-ionic bonds to the carbon atoms, which are disposed in virtually undistorted, planar sheets. For the range of composition in which C/sub x/F/sub 1-δ/(HF)/sub δ/ is an electrical conductor ($x \geq 2.3$), the fluorination was found to be electrochemically reversible.

10298 (SKBF-KBS-TR—82-17) Diffusion of hydrogen, hydrogen sulfide and large molecular weight anions in bentonite. Eriksen, T.E.; Jacobsson, A. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). 2 Jul 1982. 24p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704593.

The diffusivities of H_2S and H_2 have been determined from profile analysis and steady state transport experiments. The diffusivity of H_2S was found to be $9x10^{-12}$ and 4x10xsec^1 in MX-80 and Erbsloeh bentonite respectively. The results are in fair agreement with the results earlier obtained for Cl^- and I^-. The H_2 diffusivity calculated from steady state transport was found to be surprisingly low ($3.6x10^{-12}m^2xsec^{-1}$). Various heavy anions with molecular weights 290-30x10^3 were found to migrate through MX-80 bentonite with diffusivities in the range $(2,1\text{-}0,75)x10^{-15}m^2xsec^{-1}$.

10299 **Study of an F center in molten KCl.** Parrinello, M.; Rahman, A. (Instituto di Fisica Teorica, ISAS and GNSM del CNR, Strada Costiera 11, Trieste, Italy). *Journal of Chemical Physics;* **80**: No. 2, 860-867(15 Jan 1984).

It is shown that a discretized version of Feynman's path integral provides a convenient tool for the numerical investigation of the properties of an electron solvated in molten KCl. The binding energy, the magnetic susceptibility, and the pair correlation functions are calculated. The local structure around the solute electron appears to be different from that of an F center in the solid. The Feynman path of the electron dissolved in molten KCl is highly localized thus justifying the F center model. The effect of varying the e^--K^+ pseudopotential is also reported.

10300 **Second-harmonic reflection from silicon surfaces and its relation to structural symmetry.** Tom, H.W.K.; Heinz, T.F.; Shen, Y.R. (Department of Physics, University of California, Berkeley, California 94720 and Materials and Molecular Research Division, Lawrence Berkeley Laboratory, Berkeley, California 94720). *Physical Review Letters;* **51**: No. 21, 1983-1986(21 Nov 1983). Contract AC03-76SF00098.

Second-harmonic reflection from Si(100) and Si(111) surfaces exhibits a strong dependence on the angle of rotation of the sample about its surface normal. This behavior can be related directly to the structural symmetry of the crystal and of the surface. Analysis of the results shows that the surface and bulk contributions to the observed second-harmonic signals from Si are generally of the same order of magnitude.

10301 **X-ray-photoelectron final-state screening in transition-metal compounds.** Veal, B.W.; Paulikas, A.P. (Materials Science and Technology Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **51**: No. 21, 1995-1998(21 Nov 1983).

The cation 3s levels in fluorides of 3d transition elements have been systematically examined with use of x-ray photoelectron spectroscopy. It is shown that 3s line shapes are determined by the 3d populations (and consequent exchange splittings) associated with different core hole screening conditions. The screening mechanisms are thus identified as major contributors to the satellite structures observed in core level photoemission. An understanding of these processes is essential for the interpretation of chemical effects in photoelectron spectra.

10302 **Structure of the oxygen point defect in $SnMo_6S_8$ and $PbMo_6S_8$.** Hinks, D.G.; Jorgensen, J.D.; Li, H. (Materials Science and Technology Division, Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **51**: No. 20, 1911-1914(14 Nov 1983).

Rietveld structural refinement of neutron powder diffraction data for Chevrel-phase samples in both the Sn-Mo-S-O and Pb-Mo-S-O systems has led to a model for an oxygen-containing point defect. The oxygen substitutes for the sulfur located in the special position along the 3 axis and the metal ion is displaced ≅0.8 A toward the oxygen impurity, presumably forming a covalent bond. This defect is responsible for the wide variation reported for T/sub c/ and c/a (hexagonal, lattice-constant ratio).

10303 **Study of new $4f^7$ levels of Eu^{2+} in CaF_2 and SrF_2 using two-photon absorption spectroscopy.** Downer, M.C.; Cordero-Montalvo, C.D.; Crosswhite, H. (Division of Applied Sciences, Harvard University, Cambridge, Massachusetts 02138). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 4931-4943(1 Nov 1983).

Two-photon dye-laser excitation is used to observe numerous sharp $4f^7$ levels of Eu^{2+} in CaF_2 and SrF_2 which are overlapped by the $4f^65d$ band, and thus inaccessible to single-photon spectroscopy. $4f^7$ excited states belonging to the ^6I and ^6D groups have been identified for the first time. Energy-level calculations are presented which confirm the f^7-level assignments and determine free-ion and crystal-field parameters for both host lattices. Measurements of the relative intensities and polarization dependence of the $f^7 \rightarrow f^7$ transitions confirm the existence of third- and fourth-order contributions to the two-photon intensities which have been postulated in recent analyses of the two-photon spectrum of the isoelectronic Gd^{2+} ion. In some cases (^{8}S/sub 7/2/→^{6}P/sub 7/2,5/2/, ^{6}D/sub 7/2/), however, these higher-order contributions are weaker than expected. It is shown that by relaxing the closure approximation in summing over the intermediate states, the agreement with the data is improved.

10304 **Magnetic response of spin-density waves in a quasilinear half-filled Hubbard band.** Lyo, S.K. (Sandia National Laboratories, Albuquerque, New Mexico 87185). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 5210-5215(1 Nov 1983).

The linear and nonlinear response of spin-density waves (SDW) to a magnetic field is studied in a quasi-one-dimensional half-filled Hubbard band within a mean-field approximation. We find that the linear transverse susceptibility remains nearly temperature independent below the SDW transition, while the longitudinal susceptibility drops exponentially with the temperature. At low fields we prove that the free energy is minimum when the field is perpendicular to the spontaneous magnetization and maximum when it is parallel. Regardless of its magnitude, a transverse field is shown to have no significant effect on the temperature dependence of the spontaneous magnetization and the susceptibility in agreement with data. On the other hand, a large longitudinal field destroys the SDW. In this case the free energy is maximum and a much lower energy is obtained by reorienting the spontaneous magnetization perpendicular to the field. The relevance of the results to the organic conductors $(TMTSF)_2X$ (tetramethyltetraselenafulvalene; X = PF_6 and AsF_6) is discussed.

10305 **Hysteretic behavior of the diluted random-field Ising system Fe/sub 0.70/Mg/sub 0.30/Cl_2.** Wong, P.; Cable, J.W. (Schlumberger-Doll Research, Ridgefield, Connecticut 06877). *Physical Review* [*Section*] *B: Condensed Matter;* **28**: No. 9, 5361-5364(1 Nov 1983). Contract W-7405-ENG-26.

We report a systematic neutron scattering study of the hysteretic behavior of the randomly diluted metamagnet Fe/sub 0.70/Mg/sub 0.30/Cl_2 in magnetic fields, which is presumed to correspond to the three-dimensional Ising model in random fields. In general, we find that the low-temperature state of the system is disordered if it is approached from the disordered paramagnetic phase, but ordered if it is approached from the zero-field-ordered phase. In contrast to typical spin-glass systems, time dependence is observed for the field-cooled states. Plausible explanations for these phenomena and further experiments are suggested.

10306 **Fluoride glass compositions.** El-Bayoumi, O. US Patent Application 6-521,778. 9 Aug 1983. 12p.

This invention relates to Fluoride-based glasses that exhibit a high degree of transparency throughout the near ultraviolet visible and mid infrared portions of the spectrum. The glasses are composed of MgF2 and ZnF2 as essential compositional ingredients together with at least two other metallic fluorides from the group of YbF3, ThF4, PbF2, A1F3 and MnF2.

10307 **Silicon sheet technologies.** Ciszek, T.F. (Solar Energy Research Institute, Golden, Colorado). *Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovoltaic Specialists Conference;* 316-326(Sep 1982). (CONF-820906—). Contract AC02-77CH00178.

From 16. IEEE photovoltaics specialists conference; San Diego, CA, USA (28 Sep 1982).

A classification of silicon sheet growth methods by meniscus geometry permits them to be discussed in three groups: short meniscus techniques, high meniscus techniques, and extended meniscus or large solid/liquid interface area techniques. A second parameter, meniscus shaper interaction with the liquid silicon, is also instrumental in determining the characteristics of the various sheet processes. The current status of each process is discussed in the context of meniscus geometry and shaper/melt interaction. One aspect of sheet growth, surface area generation rate, is quantitatively compared with combined ingot growth and wafering surface area generation rates.

40 CHEMISTRY

REFER ALSO TO CITATION(S) 10000, 10001

10308 (UCRL—90099) Three-dimensional graphics for scientific data display and analysis. Grotch, S.L. (Lawrence Livermore National Lab., CA (USA)). Dec 1983. Contract W-7405-ENG-48. 28p. (CONF-8309191—1). NTIS, PC A03/MF A01. Order Number DE84004075.

From NATO Advanced Study Institute: chemometric; Cosenza, Italy (1 Sep 1983).

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Techniques for displaying scientific data in three dimensions are examined using a variety of real examples. Among the types of plots illustrated are: three-dimensional scatterplots, combined surface/contour plots, and combined surface/point displays. A variety of useful features which will enhance the utility of these plots is illustrated. Such displays have proved extremely valuable in providing insights into many problems of chemometrics.

4001 Analytical And Separations Chemistry

REFER ALSO TO CITATION(S) 9260, 9263, 9264, 9299, 9512, 9514, 9524, 9529, 9709, 10552, 10597, 10624, 10747, 10824, 10960

10309 (CEA-CONF—6699) Recent developments in spectrophotometry with optical fibers for in situ measurement of uranium VI in solution. Boisde, G.; Linger, C.; Perez, J.J. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). Apr 1983. 6p. (In French). (CONF-830423—15). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750275.

From 5. symposium on safeguards and nuclear material management; Versailles, France (19 Apr 1983).

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The development of optical fiber systems for remote spectrophotometric measurements in a nuclear environment, and the modeling of the spectral variation of uranium VI in different nitric acidity conditions (0.2 to 5N) are examined. Two "in situ" measurement systems are described and compared: - Telephot 3N is a photometer with three wavelengths and interchangeable interference filters. The measurement cell, equiped wich optical fibers is of circulation or the "pencil" type. - Diode matrix spectrophotometer type HP 8450 was used in combination with a HP 85 microcomputer to measure solutions "in situ" containing 1 to 300 $g.l^{-1}$ uranium VI in the range from 0.2 to 5N in nitric acidity. The spectrophotometer was coupled with optical fibers for remote measurement in irradiating environment.

10310 (CEA-CONF—6789) French AEC nuclear microprobe: description and first application examples. Engelmann, C.; Bardy, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France); CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). May 1983. 8p. (CONF-830570—7). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750292.

From 6. international conference on ion beam analysis; Temple, AZ, USA (22 May 1983).

The major components of the microprobe are briefly described. The performances and the varying possibilities authorized by the instrument are given. Some application examples concerning especially the determination of concentration profiles in an aqueous leached glass and the distribution of deuterium in a graphite sample exposed to plasma in a Tokamak device are presented.

10311 (CONF-840101—2) Inductively coupled plasma-atomic emission spectrometry (ICP-AES) in support of nuclear waste management. Huff, E.A.; Horwitz, E.P. (Argonne National Lab., IL (USA)). 1984. Contract W-31-109-ENG-38. 26p. NTIS, PC A03/MF A01. Order Number DE84005267.

From Winter conference on plasma spectrochemistry; San Diego, CA, USA (2 Jan 1984).

Simulated complex nuclear waste solutions are characterized by Inductively Coupled Plasma-Atomic Emission Spectrometry (ICP-AEC). The system uses and ICP source focused on both a polychromator and a computer-controlled scanning monochromator for intensity measurements. This instrumentation allows for simultaneous and sequential measurements of liquid extraction distribution coefficients needed in the development of process flow sheets for component separations. A large number of elements are determined rapidly with adequate sensitivity and accuracy. The focus of this investigation centers on the analysis of nuclear fission products. 13 references, 13 tables.

10312 (DOE/ER/10635—3) Glow discharge as an atomization and ionization device. Progress report, November 1, 1982-November 1, 1983. Harrison, W.W. (Virginia Univ., Charlottesville (USA). Dept. of Chemistry). 1984. Contract AS05-80ER10635. 7p. NTIS, PC A02/MF A01. Order Number DE84005253.

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Whether by direct resonant ionization or laser enhanced ionization, the result is a selective mass spectrum which features only isotopes of the selected element. The glow disharge offers possibilities for both resonance ionization mass spectroscopy and laser enhanced ionization with its various internal excitation possibilities. The combination of a tunable dye laser with the glow discharge can yield an advantageous method for the direct analysis of solids by mass spectrometry.

10313 (GJ/TMC—10(83)) Development of solid radium-226 reference materials. Chessmore, R.B.; Engelder, P.R.; Sill, C.W. (Bendix Field Engineering Corp., Grand Junction, CO (USA); EG and G Idaho, Inc., Idaho Falls (USA)). Nov 1983. Contract AC13-76GJ01664. 30p. NTIS, PC A03/MF A01. Order Number DE84004375.

Radium-226 reference materials having a matrix similar to soil or tailings samples are not available in sufficient quantity for use by remedial-action contractors to calibrate their laboratory gamma-ray spectrometers. Such reference materials are needed to provide uniform standardization among measurements made by remedial-action contractors. A task, therefore, was undertaken to prepare about 200 pounds each of three different concentrations of radium-226 reference materials by diluting tailings with high-purity silica. Target values for radium-226 content were 50, 15, and 5 pCi/g. The radium-226 content of the reference materials was measured by C.W. Sill of EG and G Idaho, Inc., Idaho Falls, using a high-resolution alpha spectrometry technique standardized with National Bureau of Standards (NBS) standard 4961. A summary of this technique is provided in Appendix A of this report. An independent measurement of the radium-226 content was conducted by Bendix Field Engineering Corporation (Bendix), Grand Junction, Colorado, using a high-resolution Ge(Li) detector, which was calibrated using the New Brunswick Laboratory (NBL) 100-A Series standards. The Ge(Li) detector has also been used to determine the radium-226 content in the calibration models at the Grand Junction facility; these models are used by remedial-action contractors for calibration of borehole logging gamma-ray probes. 8 references, 12 tables.

10314 (IAEA-R—1726-F) Non-destructive multielement analysis of airborne particulates by means of instrumental neutron activation method. Final report for the period 1 December 1975 - 28 February 1981. Mamuro, T. (International Atomic Energy Agency, Vienna (Austria)). Apr 1981. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704532.

Suspended particles released from various sources, such as iron and steel works, small facilities (metal melting furnaces, heat treatment furnaces), various boilers using different kinds of fuel, and glass manufactures were subjected to multi-element analysis by means of instrumental neutron activation methods and energy dispersive X-ray fluorescence spectrometry. Elemental concentrations of the suspended particles were naturally quite varied. The contribution of various aerosol generating sources to the urban atmosphere was estimated, considering seven main source components, namely soil particles of local and global origin, marine aerosols, suspended particles from iron- and steel industries, refuse incineration, fuel oil combustion and gasoline engine automobiles. Taking seven elements, such as Na, Al, K, Se, V, Un and Pb as index ele-

ments, their predicted atmospheric concentrations agreed with the observed ones for major elements within a factor of 1.5. Seasonal variations of atmospheric concentrations of various elements over some areas in Japan were observed. It was found that the concentration of global aerosol originating from the continental soil becomes high in spring, resulting in high concentrations of lithoidal elements, such as Al and Sc. Contrary to this, the concentration of elements originating mainly from human activities becomes high around November and December.

10315 **(ININ—29) Phase characterization of the residues of the plant Comandante Pedro Soto Alba.** Diaz Ruano, A.; Fernandez Miranda, J. (Academia de Ciencias de Cuba, La Habana. Inst. de Investigaciones Nucleares). Apr 1980. 18p. (In Spanish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704533.

It has been studied of the phases present in the solid industrial residues of the plant Comandante Pedro Soto Alba (Moas's tails). It is done a preliminary qualitative characterization by X ray diffraction. It is done a characterization by differential and gravimetric thermal analysis and a quantitative valuation of SO_3 and H_2O present in the samples. A complex of S and Al is detected. The results of SO_3 are compared with those obtained by the gravimetric method to verify those of Al, an elemental analysis by neutron activation was solicitated. A formula for the complex of S and Al is proposed.

10316 **(ININ—30) Fluorescent and X-ray diffraction analysis for industrial wastes of the Comandante Cedro Soto Alba plant.** Herrera, V. (Academia de Ciencias de Cuba, La Habana. Inst. de Investigaciones Nucleares). May 1980. 13p. (In Spanish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704534.

It is presented a qualitative X-ray elemental fluorescence and diffraction analysis of the low-nickel portion (deands) of Cuban lateritic ores from Moa and Nicaro, the tailings of the Cuba nickel plant Comandante Pedro Soto Alba (in Moa) and its magnetic concentrated fractions (results of enrichment test in magnetizing roasting and wet magnetic separation). In all samples as main phase hematite (α-Fe_2O_3) is observed. In all deands samples there were also high concentrations of goethite (α-FeOOH) and aluminium hydroxide ($Al(OH)_3$). In the Nicaro deands, in addition to name above phases, a modification of delta-iron hydroxide, with Ni and/or Co substitutions in the forms delta-(Fesub(0,67)Nisub(0,33))OOH, delta-(Fesub(0,67)Cosub(0,33))OOH or delta-(Fesub(0,67)Nisub(x)Cosub(0,33-x))OOH seems possible. In Moa tailings besides the hematite, the more abundant phases are a basic hydrated aluminium sulphate and gypsum. The magnetic enriched fractions are practically by a spinel of the maghemite type, and chromium seems to be included into the spinel lattice.

10317 (INIS-mf—8642, pp 15) **Chromium determination in gallium arsenide.** Mastalka, A.; Frana, J. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky); Buerger, A.; Beran, J. (Tesla, Prague (Czechoslovakia). Vyzkumny Ustav pro Sdelovaci Techniku). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10318 (INIS-mf—8642, pp 16) **Instrumental activation analysis of sludge specimens.** Simkova, M.; Lestinova, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10319 (INIS-mf—8642, pp 17) **Application of INAA in monitoring environmental pollution by car exhaust gas.** Jiranek, V. (Vyzkumny Ustav Potravinarskeho Prumyslu, Prague (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10320 (INIS-mf—8642, pp 18) **Use of radiative neutron capture in determination of sulfur in coal.** Pospisil, S.; Janout, Z. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska); Vobecky, M. (Ceskoslovenska Akademie Ved, Prague. Ustav Nuklearni Biologie a Radiochemie); Dana, J. (Geoindustria n.p., Tuchlovice (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10321 (INIS-mf—8642, pp 19-20) **Determination of technologically important elements in nickel ores using radiative neutron capture.** Vobecky, M.; Valasek, J. (Ceskoslovenska Akademie Ved, Prague. Ustav Nuklearni Biologie a Radiochemie); Gerndt, J.; Janout, Z.; Pospisil, S. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10322 (INIS-mf—8642, pp 21) **Simultaneous determination of Cd, Cu, Mo, Zn in biological samples using neutron activation analysis combined with radiochemical separation.** Kucera, J.; Simkova, M.; Faltejsek, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10323 (INIS-mf—8642, pp 22) **Use of INAA in monitoring losses of trace elements during ashing of biological materials.** Jiranek, V. (Vyzkumny Ustav Potravinarskeho Prumyslu, Prague (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10324 (INIS-mf—8642, pp 24) **Comparison of platinum determination in biological samples using RNAA with other analytical methods.** Drobnik, J. (Ceskoslovenska Akademie Ved, Prague. Ustav Makromolekularni Chemie); Kucera, J. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)); Brabec, V.; Vrana, O.; Kleinwaechter, V. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10325 (INIS-mf—8642, pp 25) **Neutron activation analysis of resistance wires.** Mayer, J. (Vyzkumny Ustav Hutnictvi Zeleza, Dobra (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10326 (INIS-mf—8642, pp 36) **Determination of nitrogen, phosphorus, potassium, and chlorine levels in fertilizers by NAA using 14 MeV neutrons.** Kern, M.; Salzer, P.; Melich, M.; Dobias, M. (Ustav Radioekologie a Vyuzitia Jadrovej Techniky, Kosice (Czechoslovakia)). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10327 (INIS-mf—8642, pp 37) **Determination of nitrogen and phosphorus levels in biological materials by NAA method using 14 MeV neutrons.** Melich, M.; Kern, M.; Salzer, P.; Dobias, M. (Ustav Radioekologie a Vyuzitia Jadrovej Techniky, Kosice (Czechoslovakia)). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10328 (INIS-mf—8642, pp 38) **Use of MTA 1527-2000 automatic activation analyzer in determining SiO_2 and Al_2O_3 in kaolin and clay samples.** Moucka, V. (Geoindustria, Prague (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10329 (INIS-mf—8642, pp 39) **Activation analysis of soils using 14 MeV neutrons.** Salzer, P.; Melich, M.; Kern, M.; Dobias, M. (Ustav Radioekologie a Vyuzitia Jadrovej Techniky, Kosice (Czechoslovakia)). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10330 (INIS-mf—8642, pp 40) **Use of characteristic radiation backscattering in eliminating matrix effect in X-ray fluorescence analysis.** Kliment, V.; Sandrik, R. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10331 (INIS-mf—8642, pp 41) **Determination of uranium in solutions and absorbents by measuring soft gamma radiation absorption.** John, J.; Spevackova, V.; Sebesta, F.; Sedlacek, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10332 (INIS-mf—8642, pp 42) **X-ray fluorescence analysis of metallic glasses.** Sandrik, R.; Kliment, V. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10333 (INIS-mf—8642, pp 50) **Oxygen determination by NAA for development of reference materials.** Zitnansky, B. (Ceskoslovensky Metrologicky Ustav, Bratislava); Adamek, A.; Sacha, J. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Fyzikalny Ustav). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10334 (INIS-mf—8642, pp 45) **Contribution to thin layer chromatography of radioactive materials.** Dedkova, V.; Formankova, E. (Ceskoslovenska Akademie Ved, Prague. Ustav Nuklearni Biologie a Radiochemie). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10335 (MLM—3093(OP)) **Determination of Cr(VI) and Cr(III) by ICP.** Brehm, L.T.; Ishida, Y.G.; Finney, R.J. (Monsanto Research Corp., Miamisburg, OH (USA). Mound). 1983. Contract AC04-76DP00053. 18p. (CONF-8308154—1). NTIS, PC A02/MF A01. Order Number DE83016627.

From 31. national technician symposium; Denver, CO, USA (28 Aug 1983).

This report describes the investigation of the extraction separation of Cr(VI) and Cr(III), the development of an inductively coupled plasma (ICP) procedure for the quantitative determination of Cr(VI) and Cr(III), and the application of the procedure to the analysis of pyrotechnic materials.

10336 (UCRL—89459) **BAGI: a new concept for detecting and tracking hazardous gases.** McRae, T.G. (Lawrence Livermore National Lab., CA (USA)). Oct 1983. Contract W-7405-ENG-48. 31p. (CONF-840475—2). NTIS, PC A03/MF A01. Order Number DE84004061.

From Hazardous material spills conference; Nashville, TN, USA (9 Apr 1984).

A new concept for the detection and tracking of toxic or flammable gases resulting from accidental spills or leaks is presented. The Backscatter Absorption Gas Imaging (BAGI) technique is based on the optical radiation augmentation of the field of view of an imaging device by laser radiation corresponding to an absorption line of the gas species to be detected. The technique also requires that there be a reflective or scattering background in the field of view and that the laser wavelength correspond to an atmospheric window. Several schematic representations of possible BAGI systems, along with some minimum detectable gas concentrations and laser combinations, are presented. In addition, a list of about 20 toxic and flammable materials which show a high probability of absorption of carbon dioxide (CO_2) laser radiation are included. The BAGI system performance parameters of laser power, image system spectral bandwidth, terrain reflectivity, and range are discussed. The laser power requirements are greatly reduced by synchronizing the unexpanded laser beam with the raster-like, scanning field of view of the flying-spot imager. It is estimated that a production-grade BAGI system will cost about $50K per unit. An example of the range and detection sensitivity for the BAGI methane gas detection system are presented and discussed.

10337 **Tunable VUV light generation for the low-level resonant ionization detection of krypton.** Kramer, S.D.; Chen, C.H.; Payne, M.G.; Hurst, G.S.; Lehmann, B.E. (Oak Ridge National Laboratory, Health & Safety Research Division, Chemical Physics Section, Oak Ridge, Tennessee 37830). *Applied Optics;* **22**: No. 20, 3271-3275(15 Oct 1983).

High-power tunable VUV light pulses with energies up to 0.7 μJ were generated in the 115.7-116.9-nm region by use of a two-photon resonant four-wave mixing scheme in a Xe-Ar gas mixture. This is the highest reported pulse energy that has been produced in this wavelength region using a four-wave mixing process. Efficient detection of krypton isotopes at densities as low atoms/cm^3 was demonstrated by resonantly ionizing the atom through its one-photon allowed state at the vacuum wavelength of 116.49 nm.

10338 **Rare earth analysis of zinc-bearing volcanogenic massive sulfide systems.** Laul, J.C.; Bence, A.E.; Lepel, E.A.; Wogman, N.A. (Battelle-Pacific Northwest Laboratory, P.O. Box 999, Richland, WA 99352). *Transactions of the American Nuclear Society;* **44**: 196-197(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

10339 **A partial equilibrium model to characterize the precipitation of ferric ion during the leaching of chalcopyrite with ferric sulfate.** Liddell, K.C.; Bautista, R.G. (Ames Laboratory, USDOE). *Metallurgical Transactions,* [*Section*] *B: Process Metallurgy;* **14B**: No. 1, 5-17(Mar 1983). Contract AM03-76SF00034.

A partial equilibrium model has been developed and used to characterize the conditions under which precipitation of ferric ion occurs during the dump leaching of chalcopyrite ores. The precipi-

tates considered include amorphous $Fe(OH)_3$, α-FeOOH (goethite), and Na^+, K^+, Ag^+, Pb^{2+}, and H_3O^+ jarosites. The concentration product for $Fe(OH)_3$ (am) and α-FeOOH was calculated for changing solution concentrations and compared with the solubility product constants to determine when precipitation would be expected thermodynamically. The K^+, Na^+, Ag^+, and Pb^{2+} concentrations necessary to satisfy the solubility product constants were calculated for initial concentrations and varying amounts of O_2 consumption.

10340 **Nondestructive photon analysis of ^{241}Am in soils and sediment utilizing self-absorption corrections.** Larsen, I.L.; Lee, S.Y. (Oak Ridge National Lab., TN (USA)). *Journal of Radioanalytical Chemistry;* **79**: No. 1, 165-169(1983).

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A direct nondestructive method of analysis for ^{241}Am utilizing photon counting and self-absorption correction factors is presented. The method gives favorable agreement for samples analyzed by radiochemical separation procedures and alpha particle spectrometry. The comparison was made over a range of approximately five orders of magnitude of ^{241}Am concentrations. The method is reliable and relatively simple. Sensitivity for an approximately 5-g sample and counting intervals of 60000 s is approximately 0.2 pCi/g with an uncertainty of +-22%, which decreases to +-11% for increased counting intervals of 150000 s and an increased sample size of approximately 20 g.

10341 **Fully computerized system for processing gamma spectra in neutron activation analysis (NAA) of plants and fodders.** Srapenyants, R.A.; Novikov, A.I. (VIUA, Moscow). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1665-1668(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

This paper describes a fully computerized System for data processing in NAA using fast-neutron (14 Mev) Generator to study biological materials. The practical recommendations are given for the development of NAA procedures predicated upon the character and the problem defined.

10342 **Trace element analysis of biological materials: Complementarity of PIXE and NAA.** Maenhaut, W.; De Reu, L.; Roessler, G.S.; Swanson, J.W.; Van Rinsvelt, H.A.; Williams, M.D. (Instituut voor Nucleaire Wetenschappen, Rijksuniversiteit Gent, Proeftuinstraat 86, B-9000 Gent). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1386-1391(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Some 26 of the 90 naturally occurring elements are generally regarded to be essential for animal life. Of those, 15 are referred to as trace elements, i.e. F,Si, V,Cr,Mn,Fe,Co,Ni,Cu,Zn,As,Se,Mo,Sn and I. In addition to the essential elements, many more trace elements are observed in living tissues. They include Al,Ti,Br,Rb, Cd,Sb,Cs,Au,Hg,Pb and others. Some of these elements (e.g. Cd,Hg,Pb) are often included in multi-element measurements because of their known toxicity, while others (e.g. Br,Rb) are of interest because they may replace essential elements under certain conditions and eventually become regarded as essential elements as well. By combining PIXE and NAA more trace elements can be determined in biological materials than by any of the two techniques alone. This is demonstrated in applications to serum and serum albumin samples and in a study of trace elements in tumor and lung tissues, collected from mice injected with B-16 melanoma tumor cells.

10343 **Large scale study of tooth enamel.** Bodart, F.; Deconninck, G.; Martin, M.Th. (Faculte's Universitaires de Namur, Namur, Belgium). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1401-1403(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Human tooth enamel contains traces of foreign elements. The presence of these elements is related to the history and the environment of the human body and can be considered as the signature of perturbations which occur during the growth of a tooth. A map of the distribution of these traces on a large scale sample of the population will constitute a reference for further investigations of environmental effects. One hundred eighty samples of teeth were first analysed using PIXE, backscattering and nuclear reaction techniques. The results were analysed using statistical methods. Correlations between O, F, Na, P, Ca, Mn, Fe, Cu, Zn, Pb and Sr were observed and cluster analysis was in progress. The techniques described in the present work have been developed in order to establish a method for the exploration of very large samples of the Belgian population.

10344 **Multielement neutron activation analysis of an iron ore.** Raoof, M.A.; Abdul-Fattah, A.F.; Naeem, A.; Obeid, M.A.; Zaghloul, R. (Univ. of Riyad, Riyad). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* No. 2, 1700-1702(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Multielement analysis of an iron ore from the Kingdom of Saudi Arabia was carried out using Instrumental Neutron Activation Analysis. The samples were irradiated in the 100 KW Argonaut Reactor at VPI & SU. The irradiation procedure consisted of two irradiations and three gamma spectra measurements after a decay time ranging from 1.33 min to 10 days. The gamma spectra were recorded by two Ge(Li) detectors. The spectra were analysed by an off line computer program. The concentrations of the elements were calculated from the area under the specific gamma peak, activation data and the specific activity of the element. Twenty-five elements are observed to be present in the ore. The elements of major interest are, Fe, Al and Ca with 51.5%, 3.6% and 2.2% concentrations respectively.

10345 **14 MeV neutron activation analysis of geological and lunar samples.** Laul, J.C.; Wogman, N.A. (Battelle Pacific Northwest Laboratories, Richland, Washington 99352). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1703-1705(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

14 MeV neutron activation analysis (NAA) is ideal for accurately determining Oxygen and Silicon contents in geological and lunar materials. It is fast, nondestructive, economical, and can be used on a routine basis in a laboratory. Although 14 MeV NAA is particularly suited to light elements, its use has been extended to measure other elements as well such as Aluminum, Magnesium, Iron, Calcium, Titanium, Strontium, Nickel, Yttrium, Zirconium, Niobium and Cerium. Thus, the use of 14 MeV neutrons is of considerable importance in NAA. The disadvantages of the method are that interference reactions are common because of high neutron energy; the flux is nonuniform in longer irradiation due to depletion of the target in the neutron generator. Overall, 14 MeV NAA is ideal for short irradiations and when supplemented with thermal NAA provides the maximum elemental information in small aliquants of geological and lunar materials.

4002 Inorganic And Physical Chemistry

REFER ALSO TO CITATION(S) 9537, 10356, 10375, 10376, 10747

10346 **(DOE/METC—83-70) Sensitivity analysis and model optimization for reaction-diffusion systems.** Irwin, C.L.; Komkov, V. (USDOE Morgantown Energy Technology Center, WV). Feb 1984. 22p. NTIS, PC A02/MF A01. Order Number DE84003056.

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This paper presents a computational framework for the optimization and sensitivity analysis of a process whose state depends upon several parameter functions. Assuming that the process is described by a system of quasilinear, parabolic, partial differential equations, we show how determining problem parameters to improve an associated objective functional is directly related to know-

ing the state function sensitivities. An expression for the gradient of the objective functional in terms of the solutions of an adjoint system enables one to bypass the calculation of state function sensitivities. These concepts are illustrated for a simple model of cooperative processes in chemical kinetics, and parameter identification are important motivations for this paper.

10347 **(DOE/PC/60779—1) Advanced NMR characterization of zeolite catalysts. First quarterly report, 1 September-30 November 1983.** Welsh, L.B. (Signal UOP, Inc., Des Plaines, IL (USA). Research Center). Dec 1983. Contract FG22-83PC60779. 10p. NTIS, PC A02/MF A01. Order Number DE84005350.

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The program discussed in this report is a two-year two-phase joint UOP-University of Illinois study of the application of improved high resolution solid state nuclear magnetic resonance (NMR) techniques to the characterization of zeolite catalysts. During the first phase of this program very pure, and in some cases isotopically enriched faujasites will be prepared and studied by magic angle sample spinning NMR (VASSNMR) and variable angle sample spinning NMR (MASSNMR) on 500 and 360 MHz (proton frequency) NMR spectrometers. Techniques that will be emphasized are the measurement and analysis of the ^{17}O NMR properties, ^{27}Al NMR intensity quantitation, and ^{27}Al and ^{29}Si NMR relaxation rates. The main effort during the first three month period of the program has been the development of the faujasite preparation techniques required for the preparation of ^{17}O enriched faujasites. Because of the cost of the ^{17}O enriched water used in such preparations, it is necessary to make the minimum sized zeolite batch necessary for standard characterization and NMR measurement by techniques that minimize the amount of enriched water per unit weight of product (faujasite). Such techniques have been developed during the first three months of this program and both standard and NMR characterizations made of the resulting faujasites. The results to date demonstrate that pure, highly crystalline faujasites are obtained by these preparation techniques. 2 references, 3 figures, 2 tables.

10348 (INIS-mf—8642, pp 23) **Study of synthetic carbide behaviour in chlorination using radioactive tracers.** Vanicek, M.; Mayer, J. (Vyzkumny Ustav Hutnictvi Zeleza, Dobra (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10349 **(K/OA—5578) Liquid-phase compositions from vapor-phase analyses. I. Thermodynamic properties at UF_6 and some of its potential impurities.** Davis, W. Jr. (Oak Ridge Gaseous Diffusion Plant, TN (USA)). Dec 1983. Contract W-7405-ENG-26. 38p. NTIS, PC A03/MF A01. Order Number DE84005259.

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It is shown that there are appropriate data for calculating the distributions of many potential impurities between liquid and vapor phases in which UF_6 is the principal component, at least in the liquid phase. Such calculations are presented for nine chemicals assumed to be present in the vapor phases at concentrations of 1 and 2 mole %.

10350 **(LBL—16998) Some nitrogen-14 NMR studies in solids.** Pratum, T.K. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 318p. NTIS, PC A14/MF A01. Order Number DE84005172.

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The first order quadrupolar perturbation of the ^{14}N NMR spectrum yields information regarding the static and dynamic properties of the surrounding electronic environment. Signal to noise problems caused by long ^{14}N longitudinal relaxation times (T_1) and small equilibrium polarizations are reduced by rotating frame cross polarization (CP) experiments between ^{14}N and ^{1}H. Using quadrupolar echo and CP techniques, the ^{14}N quadrupolar coupling constants (e^2qQ/h) and asymmetry parameters (eta) have been obtained for a variety of tetraalkylammonium compounds by observation of their quadrupolar powder patterns at various temperatures. For choline chloride and iodide the ^{14}N NMR powder patterns exhibit the effects of anisotropic molecular motion, while choline bromide spectra show no such effects.

10351 **(PB—83-263236) Investigation of lyoluminescence techniques for application in radiation-protection dosimetry. Final report Jan 1980-Jan 1982.** Hanig, R. (National Bureau of Standards, Washington, DC (USA). Radiation Physics Div.). Aug 1983. 57p. NTIS, PC A04/MF A01.

The goal of this research is to improve the sensitivity and reproducibility of lyoluminescence by using different instrumentation, using purer reagents and sensitizing agents, and using new and doped phosphors. Also modeling for the light output vs time may help in evaluating future spectral and kinetic data.

10352 **Lattice theory of reaction efficiency in compartmentalized systems. II. Reduction of dimensionality.** Lee, P.H.; Kozak, J.J. (Department of Chemistry and Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556). *Journal of Chemical Physics;* **80**: No. 2, 705-713(15 Jan 1984).

The timing and efficiency of a diffusion-controlled kinetic process in a compartmentalized system can be enhanced by reducing the dimensionality of the reaction space of the system. This idea, introduced by Adam and Delbrueck and referred to as "reduction of dimensionality," is explored quantitatively in this paper using a lattice theory of reaction efficiency developed in our earlier work. In particular, we study the interplay between system geometry and reaction efficiency using an approach in which group theoretic arguments are used within the framework of the theory of finite Markov processes to determine the average number $\langle n \rangle$ of steps required for a diffusing coreactant A to undergo an irreversible reaction with a stationary target molecule B. We study in detail three classes of problems in this paper. First, we study as a function of the position of the reaction center how the efficiency of the underlying, irreversible, reaction-diffusion process $A+B \rightarrow C$ changes with increase in system size for symmetrical geometries. We show how reducing the dimensionality of the flow of the diffusing coreactant leads to a crossover in reaction efficiency with increase in the size of the system, and document this effect as a function of N (the total number of sites characterizing the reaction space of the system), d (the dimensionality of the system), and ν (the valency or connectivity between adjacent sites in the reaction space).

10353 **Microstructure of two-phase random media. IV. Expected surface area of a dispersion of penetrable spheres and its characteristic function.** Torquato, S.; Stell, G. (Department of Mechanical and Aerospace Engineering, North Carolina State University, Raleigh, North Carolina 27650). *Journal of Chemical Physics;* **80**: No. 2, 878-880(15 Jan 1984).

A new expression is derived for the expected surface area of a dispersion of spheres distributed with arbitrary degree of penetrability. A convenient representation of the characteristic function of the interfacial surface is also introduced.

10354 **Unusual isotope effects for diffusion in VH 0.50 and VT 0.50.** Bowman, R.C.; Attalla, A.; Craft, B.D. (Monsanto Research Corporation - Mound Miamisburg, Ohio 45342). *Scripta Metallurgica;* **17**: No. 7, 937-942(Jul 1983). Contract AC04-76DP00053.

Nonclassical diffusion processes for hydrogen isotopes in metals and other solids remain interesting and unresolved challenges. Although numerous diffusion measurements have been performed on dilute solutions of hydrogen, deuterium, and tritium in metals, relatively few results are available for diffusion of hydrogen isotopes in the hydride phases formed at higher concentrations. Since diffusion coefficients are generally dependent upon concentration, this disparity is partially due to the difficulty in preparing samples with identical contents. The vanadium hydride phases are promising candidates to study isotopic diffusion. Recent nuclear magnetic resonance (NMR) studies of proton spin-lattice relaxation times T_1 for b.c.t. βphase VH /SUB x/ ($0.4<x<0.9$) have shown anomalous hydrogen diffusion behavior. Furthermore, the remarkably large differences between the VH /SUB x/ and VD /SUB x/ phase diagrams suggest that significant isotope effects may also

occur in the diffusion processes. In fact, several unusual isotope effects in diffusion behavior for VH 0.50 and VT 0.50 are indicated from the present NMR relaxation times. Tritium atoms in β-VT 0.5 diffuse more rapidly and with a smaller activation energy than hydrogen atoms in β-VH 0.5. These inverse isotope effects are related to an enhanced T-atom mobility i β-VT 0.50 that arises from atomic exchange processes between T-atoms on inequivalent interstitial sites.

10355 **Magnetic properties of Gd^{3+}-doped lanthanum sulfides Lasub(3-x)()sub(x)S_4.** Venhuizen, W. Groningen, Netherland; Rijksuniversitelt Groningen (1982). 133p. Available from University Library, Oude Kijk in 't Jatstraat 5, 9712 EA Groningen (NL).

This thesis investigates the magnetic ordering of Gd^{3+}-doped lanthanum sulfides as a function of impurity- and conduction electron-concentration. The theory of indirect exchange interactions is applied to the Lasub(3-x)()sub(x)S_4:Gd system; a fairly large qualitative discrepancy between theory and experiment was observed and possible improvements were worked out in detail. Using a combination of experimental techniques the strength of the indirect exchange interaction as well as the density of states at the Fermi level could be determined. The remarkable deviations from the free-electron-like density of states found for some conduction electron concentrations is discussed. The superconducting/spin glass/ferromagnetic phase diagram for materials with the maximum conduction electron concentration is reported. Using mainly a.c.-susceptibility measurements the depression of the superconducting transition temperature, the interplay of superconductivity and spin glass ordering, the spin glass phase, the transition from spin glass to ferromagnet and the ferromagnetic phase were investigated as a function of Gd-concentration. Throughout this work the ESR technique was used to determine the conduction electron concentration in metallic samples. The results of some other - preliminary - investigations are discussed, resulting in a few suggestions for further study on the model system Lasub(3-x)()sub(x)S_4:Gd.

4003 Organic Chemistry

REFER ALSO TO CITATION(S) 9326, 9411, 9537, 9547, 10346

10356 **(DOE/PC/30276—T2) Thermodynamic constraints in catalytic reactions.** Shinnar, R.; Feng, C.A. (City Coll., New York (USA). Dept. of Chemical Engineering). 1982. Contract FG22-80PC30276. 57p. NTIS, PC A04/MF A01. Order Number DE84004062.

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The paper investigates in detail the implications of thermodynamic constraints on chemical reactions. A rigorous methodology and framework for such an analysis is developed. It is shown that thermodynamic analysis can be very useful in providing a structure for analyzing kinetic data. It also provides clues for development and screening of better catalysts. Strictly speaking, the only hard thermodynamic constraint on any reaction is that the overall free energy change is negative definite. However, available catalysts impose much stronger constraints on the reachable composition space. Not only must the free energy decrease for the total system, but it must also decrease for each kinetically independent ostensible reaction. The paper shows how the above constraints can be used to derive minimal bounds on the accessible composition space from thermodynamic data, if the stoichiometry of the actually occurring reactions is known. It also shows how to define the concept of a set of kinetically independent reactions in contrast to a set of stoichiometrically independent reactions. Such sets are not orthogonal and not unique, but they provide a framework for modelling complex reaction systems. Rigorous criteria are developed to test if a given set of kinetically independent reactions is consistent with a set of experimental trajectories, which is useful in screening of new catalysts. The paper also defines and discusses the concept of coupling reactions by common intermediates and the effect of coupling on the accessible composition space. Selective mass transfer processes such as semipermeable membranes and shape selective catalysts are shown to have the ability to strongly modify and remove the thermodynamic constraints that result from the nature of the chemical reaction promoted by the catalyst.

10357 **(INIS-mf—8635) Studies on the photochemistry of vision. Preparation of deuterated retinals; the study of deuterium labelled visual pigments.** Broek, A.D. (Rijksuniversiteit Leiden (Netherlands)). 31 Mar 1982. 66p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704746.

The subject of this study is the preparation of 11-cis and 9-cis retinals deuterated at specific positions of the chain with a high deuterium incorporation and a high chemical purity. The reaction of opsin with these compounds gives rhodopsin and isorhodopsin with a deuterium label on the predetermined positions of the chromophore. For the introduction of the deuterium the author has used the conversion of a propargyl alcohol into an ethylenic alcohol by the $LiAlH_4$ reductive method.

10358 **(PB—83-262311) Wind tunnel model experiments on a buoyant emission from a building.** Hall, D.J.; Barrett, C.F.; Simmonds, A.C. (Warren Spring Lab., Stevenage (UK)). [nd]. 25p. NTIS, PC AE03/MF E03.

The report describes wind tunnel model experiments of a preliminary nature on a leak of buoyant gas from the face of a building, the intention being to reproduce some facets of one kind of catastrophic reactor failure. The measurements covered heat release rates of 1 to 100 MW over a windspeed range of 1 to 10 m s. Measurements were made of ground level concentrations of the released gas downwind of the building, together with a limited number of vertical concentration measurements. Results of the experiments showed that ground level concentrations were mainly determined by plume buoyancy; the point of emission on the building, or even the presence of the building having only a secondary effect. The investigation was undertaken on behalf of the Safety and Reliability Directorate of the United Kingdom Atomic Energy Authority, who funded the project. (Copyright (c) Crown Copyright 1980.)

10359 **Competing irreversible cooperative reactions on polymer chains.** Evans, J.W.; Hoffman, D.K.; Burgess, D.R. (Ames Laboratory and Department of Chemistry, Iowa State University, Ames, Iowa 50010). *Journal of Chemical Physics;* **80**: No. 2, 936-943(15 Jan 1984).

We analyze model processes involving competition between several irreversible reactions at the sites of a 1D, infinite, uniform polymer chain. These reactions can be cooperative, i.e., the corresponding rates depend on the state of the surrounding sites. An infinite hierarchy of rate equations is readily derived for the probabilities of various subconfigurations. By exploiting a shielding property of suitable blocks of unreacted sites, we show how exact hierarchy truncation and solution is sometimes possible. The behavior of solutions is illustrated in several cases by plotting families of "reaction trajectories" for varying ratios of reactant concentrations. As a specific application, we consider competition between coordination of $ZnCl_2$ to pairs of oxygen atoms and to single oxygen atoms in poly(propylene oxide). The observed glass transition temperature behavior is eludicated.

10360 **Anomalous melting properties of some classical monolayer systems.** Abraham, B.M.; Miyano, K.; Ketterson, J.B.; Xu, S.Q. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **51**: No. 21, 1975-1978(21 Nov 1983).

The responses to shear stress of monomolecular films of fatty alcohols, C/sub n/H/sub 2n/+1OH, spread on water have been studied for n = 20, 21, and 22. A compression-induced melting transition has been observed for the first time.

10361 **Dealkylation of N,N-dimethylaniline with sulphur and hydrogen sulphide.** Stenberg, V.I.; Baltisberger, R.J.; Srinivas, V.R.; Sweeny, P.; Woolsey, N.F. (Department of Chemistry, University of North Dakota, Grand Forks, ND 58202). *Fuel;* **62**: No. 8, 913-915(Aug 1983). Contract AB18-78FC02101;AC01-76ET10516.

N,N-Dimethylaniline successively demethylates at 425°C in the presence of hydrogen and hydrogen sulphide or sulphur to give successively N-methylaniline and aniline. For the dealkylation reaction, the rank order of promotors is S > S-H_2 > H_2S > H_2S-H_2 > H_2.

10362 **Macrobicyclic (hexaamine)platinum(IV) complexes: synthesis, characterization, and electrochemistry.** Boucher, H.H. (Australian National Univ., Canberra, Australia); Lawrance, G.A.; Lay, P.A.; Sargeson, A.M.; Bond, A.M.; Sangster, D.F.; Sullivan, J.C. *Journal of the American Chemical Society;* **105**: No. 14, 4652-4661(13 Jul 1983).

Syntheses based on the reaction of $Pt(en)_3^{4+}$ with formaldehyde, and ammonia or nitromethane, yielded the macrobicyclic complexes (1,3,6,8,10,13,16,19-octaazabicyclo[6.6.6]icosane)platinum(IV), $Pt(sep)^{4+}$, and (1,8-dinitro-3,6,10,13,16,19-hexaazabicyclo[6.6.6]icosane)platinum(IV), $Pt(diamsar)^{4+}$, respectively. Reduction of the latter complex with $SnCl_2$ in acid yielded (1,8-diamino-3,6,10,13,16,19-hexaazabicyclo[6.6.6]icosane)platinum(IV), $Pt(diamsar)^{4+}$. These complexes are substitution-inert, diamagnetic octahedral ions and were characterized by X-ray crystallographic analysis of the $Pt(sep)^{4+}$ by absorption and NMR spectroscopy. Addition of an electron to the Pt(IV) complexes, radiolytically or electrochemically, yielded transient monomeric macrobicyclic Pt(III) ions. γ-Radiolysis of crystalline samples yielded a Pt(III) complex stabilized in the crystalline lattice, detected by ESR spectroscopy. Polarography of $Pt(diamsar)^{4+}$ in aprotic solvent showed essentially irreversible one-electron reductions at +0.17 and -1.00 V and two-electron irreversble reduction at -2.20 V (in acetone, vs Ag/AgCl). The Pt(III) transient of the first reduction decayed ($t_{1/2} < 10^{-3}$ s) to yield the monodeprotonated Pt(IV) complex and 0.5 mol of hydrogen/mol of complex. The liftime of the related $Pt(sep)^{3+}$ transient was longer, though still in the millisecond range. This intramolecular redox process in aprotic solvents was not observed in water, however. In aqueous solution, the $Pt(diamsar)^{3+}$ transient decayed with a first-order rate constant of 6 X 10^{-3} s^{-1} (pH 6.8 or 10.0) in pulse radiolysis experiments.

10363 **Optical detection electric field jump study of dye dimerization in glacial acetic acid.** Rhinesmith, R.J.; Hemmes, P. (Rutgers Univ., Newark, NJ). *Journal of Physical Chemistry;* **87**: No. 14, 2485-2492(7 Jul 1983). Contract AC02-78ER14945.

An optical detection electric field jump (E-jump) instrument was built by using either a xenon arc lamp or an argon ion laser source. The chemical system studied was the dimerization of methyl yellow (MeY). Its relaxation times in the concentration range 6.3-250 μM in acetic acid were best fit by a mechanism involving triple and quadrupole aggregations of the dye molecule. The forward and reverse rate constants for triple-ion formation were found to be k/sub f/ = 12.8 x 10^{10} $(Ms)^{-1}$, k/sub r/ = 2.8 x 10^5 s^{-1}, while the equilibrium constants for triple and quadrupole formation were K/sub T/ = 138 M^{-1} and K/sub Q/ = 32 M^{-1}. In the course of this study a light-induced relaxation process was observed which may be a photochemically induced cis-trans isomerization of the dye. In addition, an analysis of the factors which contribute to optimizing the signal-to-noise (S/N) ratio of the E-jump experiment has been carried out. It was found that an optimum concentration exists for the experiment, and the observed effect will have significant amplitude only in a limited region about this optimum.

10364 **Proton transfer from the formyl and isoformyl positive ions to acetylene.** Semo, N.; Osheroff, M.A.; Koski, W.S. (The John Hopkins Univ., Baltimore, MD). *Journal of Physical Chemistry;* **87**: No. 13, 2302-2303(23 Jun 1983).

The ions, HCO^+ and COH^+, were prepared by electron bombardment. Using these ions we measured the cross sections of the proton transfer reactions to acetylene over the energy range 1-6 eV (center of mass). Examination of the energy spectrum of the product ion from the reaction with HCO^+ shows that the proton transfer is proceeding by a direct mechanism rather than by persistent complex formation.

10365 **Mossbauer and infrared studies of matrix-isolated iron-carbonyl complexes.** Peden, C.H.F.; Parker, S.F.; Barrett, P.H.; Pearson, R.G. (Univ. of California, Santa Barbara). *Journal of Physical Chemistry;* **87**: No. 13, 2329-2336(23 Jun 1983). Contract AM03-76SF00034.

The matrix-isolated binary carbonyls, Fe(CO)/sub x/, $x \geqq 5$, and $Fe_2(CO)$/sub y/, y=8,9, formed upon cocondensation of iron atoms with noble gas/CO gas mixtures have been investigated by infrared and Mossbauer spectroscopies.Assignments for the Mossbauer absorptions of these species are made. New information on the C-O stretching frequencies of Fe(CO) and $Fe(CO)_2$ has been obtained. The very low infrared stretching frequency (1898 cm^{-1}) and the negative Mossbauer isomer shift (-0.60 mm/s) of Fe(CO) are evidence for a large $d\pi \rightarrow \pi^*$ interaction for this fragment.

10366 **Conversion of an η^5-C_5H_5 complex into a cyclopentadienylidene ketene complex.** Casey, C.P.; O'Connor, J.M. (Univ. of Wisconsin, Madison). *Journal of the American Chemical Society;* **105**: No. 9, 2919-2920(4 May 1983).

Transition-metal ketene complexes have been proposed as intermediates in CO reduction and have been studied as models for CO_2 metal complexes. Two types of metal η^2-ketene complexes are known: early transition metals form η^2-CO complexes while later transition metals form η^2-CC complexes. Previously, metal ketene complexes have been prepared by direct reaction of ketene with a coordinatively unsaturated metal complex, by carbonylation of metal alkylidene complexes, and by deprotonation of metal acyl complexes. It is reported that (η^5-C_5H_5)Re(CO)(NO)(CH_3) reacts with high concentrations of PMe_3 to give an η^1-C_5H_5 derivative, which is then converted to the novel cyclopentadienylidene ketene complex. This reaction further illustrates the reactivity of the normally unreactive C_5H_5 ligand.

10367 **Structure and tunneling dynamics of malonaldehyde. A theoretical study.** Bicerano, J.; Schaefer, H.F. III; Miller, W.H. (Univ. of California, Berkeley). *Journal of the American Chemical Society;* **105**: No. 9, 2550-2553(4 May 1983). Contract AC03-76SF00098.

The geometry and harmonic vibrational frequencies of equilibrium malonaldehyde and of the transition state for the symmetric intramolecular hydrogen atom transfer have been determined at the SCF level of theory (using a slightly better than double-basis set). All geometrical parameters were fully and simultaneously optimized by using SCF gradient techniques. Comparison of the equilibrium structure with the structure determined from microwave spectra shows good agreement in most respects, although there are a few differences. At the C/sub s/ equilibrium geometry and the C_s/sub v/ transition state large scale configuration interaction (all single and double excitations) calculations were carried out to determine the barrier height for the symmetric hydrogen atom transfer; including a correction for quadruple excitations, this gives a classical or "bare" barrier height of 8.0 kca./mol. A one-dimensional model for the tunneling dynamics of H-atom transfer leads to a tunneling splitting in the ground vibrational state of $\sim$ 18 cm^{-1}, in relatively good agreement with the experimental value. It is noted, though, that the value of the splitting is sensitive to the potential surface parameters (i.e., bare height, frequencies) and that there is also uncertainty about the accuracy of the one-dimensional description of the tunneling.

10368 **Molten salt catalysis. Selective bond cleavage reactions for some α,ω-diphenylalkanes in $SbCl_3$ melts.** Buchanan, A.C. III; Dworkin, A.S.; Smith, G.P. (Oak Ridge National Lab., TN). *Journal of the American Chemical Society;* **105**: No. 9, 2843-2850(4 May 1983). Contract W-7405-ENG-26.

The chemistry of the α,ω-diphenylalkanes, $C_6H_5(CH_2)$/sub n/C_6H_5 [n = 1-4], in highly purified anhydrous $SbCl_3$ and $SbCl_3$-10 mol % $AlCl_3$ melts has been investigated from 100 to 130°C by in situ ^1H NMR spectroscopy and by quench and separation techniques. These substrates, which are often used to model the aliphatic chains that link aromatic and hydroaromatic clusters in coal, are found to undergo selective cleavage of the sp^2-sp^3 bond. For n = 1 and 2 products are formed via a transaralkylation reaction, while for n = 3 and 4 the cleavage results in the selective production of only benzene and either indan (n = 3) or tetralin (n = 4). Toluene is also reactive in $SbCl_3$-$AlCl_3$, and typical transalkylation chemistry is observed. The relative rates for reaction in the aprotic $SbCl_3$ melts are in the order $PhCH_2Ph >> Ph(CH_2)_2Ph \sim Ph(CH_2)_3Ph \sim Ph(CH_2)_4Ph >> PhCH_3$. These relative reactivities, the discovery that $SbCl_3$-10 mol % $AlCl_3$ is a much more active catalytic medium than $SbCl_3$ alone, and the product distributions can be ex-

plained by a mechanism in which the rate-determining step involves the generation of benzylic cation as the key reactive intermediate by hydride abstraction by $SbCl_2^+$ in the melt. This research provides new insights into the mechanism by which an aprotic molten salt medium catalyzes bond cleavate reactions for the α,ω-diphenylalkanes at temperatures substantially below those required for thermolysis. In addition, the mechanism is discussed in relation to mechanisms proposed for the transalkylation reactions of alkylbenzenes, which normally employ strong protic acid catalysts.

10369 **Molecular complexes of copper uroporphyrin with aromatic acceptors.** Scheinutt, J.A. (Sandia National Lab., Albuquerque, NM). *Journal of Physical Chemistry;* **87**: No. 4, 605-616(17 Feb 1983). Contract AC04-76DP00789.

Copper(II) and nickel(II) uroporphyrin I form molecular complexes with a variety of aromatic heterocycles in aqueous alkaline solution. The molecular complexes have been examined with Raman difference spectroscopy. As a result of complex formation, small shifts in the frequencies of vibrational modes of the porphyrin ring occur. For the phenanthroline derivatives and methyl viologen, the shifts are similar but not identical with those observed in iron porphyrins and heme proteins when the ∂-electron density in the ring is modified. Shifts to higher frequencies in the Raman lines of CuURO-phenanthroline complexes indicate that the porphyrin acts as a donor. In the viologen dication complex CuURO is found to be an acceptor in the ground state. A correlation exits between charge donation by copper uroporphyrin (as measured by the increase in frequencies of "electron-density-sensitive" Raman lines) and the acceptor ability of the phenanthroline derivatives (as expressed by the Hammett σ's of the substituents). Consideration of the steric properties of some derivatives indicates that the structures of these complexes are such that the plane of the phenanthroline is parallel to that of the porphyrin and interactions of nitrogen lone pairs with the metal ion are not involved. A good correlation between the free energy of association and the Raman shifts is evidence that the charge-transfer interaction stabilizes the complex by up to ~3 kcal/mol.

10370 **Variational principle in rigid core expansion corresponding states methods.** Leland, T.W. pp 1080-1090 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The method of corresponding states for mixtures has been greatly improved by a new theory called the hard sphere expansion or HSE theory. This theory separates dimensionless properties of a mixture into two parts. One of these is that of a hard sphere mixture whose properties are calculated by an equation of state. The other part is that contributed by all of the intermolecular attractions in which properties are obtained by the corresponding states principle from the attraction properties of a pure reference fluid. This article concerns the problem of the calculation of the effective diameters of the hard spheres. The application of the variational principle is discussed for systems in which the intermolecular potentials are unknown. 11 references.

4004 Electrochemistry

REFER ALSO TO CITATION(S) 10053, 10362

10371 **Electrochemical reduction of calcium chromate.** Delnick, F.M.; McCarthy, D.K. (Sandia National Laboratories, Albuquerque, NM). *Journal of the Electrochemical Society;* **130**: No. 9, 1875-1877(Sep 1983). Contract AC04-76DP00789.

The electrochemical reduction of CrO_4^{2-} proceeds through a Cr(V) intermediate, CrO_4^{-3}. The reaction of this intermediate with the available cations and the concentrations of these cations determine the overall reaction mechanism and the ultimate reduction product. In LiCl-KCl eutectic, $CaCrO_4$ (> about 0.1m) is reduced to the stable intermediate $Ca_5(CrO_4)_3Cl$. In $CaCl_2$-KCl-NaCl ternary eutectic $CaCrO_4$ (> about 0.1m) is reduced to the stable intermediate Ca_3CrO_4Cl. In the presence of Li^+, each of these Cr(V) compounds is further reduced to $LiCrO_2$. No subsequent reduction of $Ca_5(CrO_4)_3Cl$ or Ca_3CrO_4Cl occurs in $CaCl_2$-KCl-NaCl ternary eutectic.

10372 **Zinc electrode morphology in alkaline solutions.** McBreen, J.; Chin, D.T.; Gannon, E.; Sethi, R. (Department of Energy and Environment, Brookhaven National Laboratory, Upton, New York). *Journal of the Electrochemical Society;* **130**: No. 8, 1641-1645(Aug 1983). Contract AC02-76CH00016.

The dependence of the faradaic conductance and the morphology of pasted zinc electrodes on the charging method has been investigated. The charging methods included d.c. (3-125 mA-cm^2) and d.c. (3-125 mA-cm^2) with superimposed square waves of a.c. of various amplitudes and frequencies (0.1-5000 Hz). In the case of d-c charging, the faradaic conductance goes through a maximum at about 75 mA-cm^2. The decrease in the faradaic conductance at higher current densities (100 mA-cm^2) is related to the formation of dense zinc deposits on the electrode surface. At low d.c. (<30 mA-cm^2), superimposition of a.c. promotes growth of zinc close to the current collector and results in small amounts of dispersed hexagonal zinc deposits on the current collector. Except where dense deposits are formed at high current density, the remainder of the zinc deposit has a very fine structure. Pulsed charging at low current densities (<30 mA-cm^2) is beneficial in that it increases the electrode faradaic conductance and promotes growth of the zinc deposit close to the current collector. The relaxation time for the double layer in pasted zinc electrodes is about 50 msec. This indicates that the optimum frequency for pulsed charging is between 1 and 10 Hz.

10373 **Electrodeposition of zinc on glassy carbon from $ZnCl_2$ and $ZnBr_2$ electrolytes.** McBreen, J.; Gannon, E. (Brookhaven National Laboratory, Department of Energy and Environment, Upton, New York). *Journal of the Electrochemical Society;* **130**: No. 8, 1667-1670(Aug 1983). Contract AC02-76CH00016.

The initial stages of the electrocrystallization of zinc from 3M $ZnCl_2$ and 3M $ZnBr_2$ on glassy carbon has been investigated using cyclic voltametry, the potential step method, and scanning electron microscopy. Particular care was taken to ensure electrolyte purity and to eliminate resistance effects in the measurements. The nucleation overvoltage in 3M $ZnCl_2$ was about 17 and about 12 mV in 3M $ZnBr_2$. In 3M $ZnCl_2$, the current transients from the potential step measurements could be fitted to a simple model that assumes instantaneous nucleation followed by growth of three dimensional centers under kinetic control. A similar mechanism is operative for 3M $ZnBr_2$ at low overvoltages. At higher overvoltages, the current transient is governed by mixed kinetic and diffusion control and cannot be fitted to a simple model. The lower nucleation overvoltage and the faster kinetics in 3M $ZnBr_2$ is correlated with the lower stability constants for the zinc bromide complexes. Erroneous results are obtained when resistance effects are not accounted for.

10374 **A neutron powder diffraction study of α- and β-PbO_2 in the positive electrode material of lead-acid batteries.** Santoro, A.; Caulder, S.M.; D'Antonio, P. (National Bureau of Standards, Washington, DC). *Journal of the Electrochemical Society;* **130**: No. 7, 1451-1459(Jul 1983).

A neutron powder diffraction study of α- and β-PbO_2, both chemically prepared and electrochemically formed in cycled battery plates, was carried out to correlate the electrochemical activity of the lead-acid battery with the atomic arrangement of the electrode constituents. Our results are consistent with the presence of hydrogen in the structure of β-PbO_2, but the departure of the occupancy factors from stoichiometric values are not large enough to unambiguously establish whether there are lead or oxygen deficiencies. If the Pb:O ratio corresponds to exact stoichiometry, any hydrogen which is present must be accompanied by a reduction of Pb^{+4}. There is a significant increase in the lattice parameter α of β-PbO_2 in cycled battery electrodes relative to the value found in chemically prepared β-PbO_2. No change in the c parameter, however, was detected. These dimensional changes are consistent with a configuration for hydrogen similar to that observed in the rutile type structure of SnO_2, in which there are OH-ions oriented per-

pendicular to the c axis. The profile parameters obtained in this analysis show that the crystallites of β-PbO_2 in the positive plate material of a battery cycled three times (Y3) are smaller than those in the chemically prepared compound (about 450A vs. 800A), while there are no significant differences between the latter and β-PbO_2 in the positive plate material of a battery cycled 36 times (Y36). The average structure of α-PbO_2 cannot be accurately determined by profile analysis, at the present time. The difficulties encountered in the refinement may be due to extensive defects, nonspherical crystallites of small size, and/or small departures of the structure from orthorhombic symmetry.

10375 **Thermodynamics of unsymmetrical electrolyte mixtures. Enthalpy and heat capacity.** Pitzer, K.S. (Univ. of California, Berkeley). *Journal of Physical Chemistry;* **87**: No. 13, 2360-2364(23 Jun 1983). Contract AC03-76SF00098.

There is a purely electrostatic contribution to the thermodynamic properties of electrolytes for the mixing of ions of different charge but the same sign. The previous treatment, which was limited to activity or osmotic coefficients, is extended to enthalpies and heat capacities and applied to the measurements of Cassel and Wood on the heat of mixing in the systems NaCl-$BaCl_2$ and NaCl-Na_2SO_4.

10376 **Thermodynamics of the unsymmetrical mixed electrolyte HCl-$LaCl_3$.** Roy, R.N. (Drury College, Springfield, MO); Gibbons, J.J.; Peiper, J.C.; Pitzer, K.S. *Journal of Physical Chemistry;* **87**: No. 13, 2365-2369(23 Jun 1983). Contract AC03-76SF00098.

The contribution of higher order electrostatic terms (beyond the Debye-Huckel approximation) has been investigated for the system H^+-La^{3+}-Cl^--H_2O. Emf measurements were carried out on solutions at temperatures from 288.15 to 318.15 K, and at ionic strengths from 0.1 to 5.0 mol kg^{-1}, by using hydrogen and silver-silver chloride electrodes. From these measurements it is possible to determine the Pitzer mixing coefficients /sup S/Θ/sub H,La/ and psi/sub H,La,Cl/ as a function of temperature. They are well represented by linear equations yeilding temperature-invariant estimates of ∂/sup S/Θ/sub H,La//∂T and ∂psi/sub H,La,Cl//∂T. These estimates may be used to predict the relative apparent molal enthalpy for aqueous solutions containing H^+, La^{3+}, and Cl^- with reasonable confidence. A brief table of the enthalpy and the activity coefficients is included.

4005 Photochemistry

REFER ALSO TO CITATION(S) 10728

10377 **(DOE/ER/03117—26) Photochemical reactions of complex molecules in condensed phase. Progress report, March 1, 1983-February 28, 1984.** Linschitz, H. (Brandeis Univ., Waltham, MA (USA). Dept. of Chemistry). 30 Dec 1983. Contract AC02-76ER03117. 24p. (COO—3117-26). NTIS, PC A02/MF A01. Order Number DE84005150.

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This past year we have continued our studies of mechanism and yield, particularly for the redox reaction between simple inorganic anions and excited (triplet) anthraquinones or ketones. In studying these anion interactions, we find yet additional factors which influence primary charge-transfer efficiency. Radical yields can be sharply increased by raising the concentration of anions which, at lower concentrations, simply quench the substrate with little or no radical formation. Our kinetic results indicate that this new effect involves formations of triple charge-transfer complexes at high anion concentrations, in competition with the initial bimolecular quenching reactions. Other studies concluded this past year have dealt with the rate and range of electron transfer from excited porphyrins to quinones, as determined in a covalently-linked structure of rigid, well-defined geometry. We show that even at 10 A separation, the main decay pathway of the excited porphyrin is via reversible charge-transfer. Finally, a new line of investigation has been opened up, concerning the chemistry and photochemistry of porphyrin aggregates (probably dimers), formed by electrostatic interaction of porphyrin macrocycles bearing oppositely charged side chains at the delta-methine bridges.

10378 **(DOE/ER/03117—27) Photochemistry of 9,10-anthraquinone-2-sulfonate in solution. Part II. Effects of inorganic anions; quenching vs. radical formation at moderate and high anion concentrations.** Loeff, I.; Treinin, A.; Linschitz, H. (Brandeis Univ., Waltham, MA (USA). Dept. of Chemistry). 30 Dec 1983. Contract AC02-76ER03117. 35p. (COO—3117-27). NTIS, PC A03/MF A01. Order Number DE84005151.

The chemical aspects of the interactions between excited 9, 10-anthraquinone-2-sulfonate (AQS) and various inorganic anions are examined. The anions which quench triplet AQS can be divided into two groups: Cl^-, Br^-, I^- and NCS^- (Group I) photoreduce the quinone to AQS^- only at concentrations higher than that required for complete triplet quenching. The effect increases with concentration and passes through a maximum with highest quantum yields of radical formation reaching ~ 1 for Cl^- and NCS^-; NO_3^-, SO_3^{2-} and N_3^- (Group II) reduce AQS in parallel to triplet quenching. The nature of the high-concentration effect shown by Group I is analyzed. Some results obtained with mixtures of anions support the conclusion that triplet AQS is also responsible for this effect and it is suggested that triple exciplexes of the type $^3(AQS^-.X_2^-)$ are involved. With this view and the recently proposed intra-radical-spin-orbit-coupling (IRSOC) model, a quantitative interpretation of the results is presented.

10379 **(DOE/ER/13067—T1) Kinetic measurements on elementary fossil fuel combustion reactions over wide temperature ranges. Progress report, 1 May-31 December 1983.** Fontijn, A. (Rensselaer Polytechnic Inst., Troy, NY (USA)). Dec 1983. Contract AC02-83ER13067. 11p. NTIS, PC A02/MF A01. Order Number DE84005149.

A High-Temperature Photochemistry (HTP) reactor facility, designed and constructed this year, is described and discussed. It is suitable for kinetics measurements on isolated elementary hydrocarbon oxidation reactions in the 300 to 1800 K temperature range. Plans for its use in the study of the reaction between oxygen atoms and ethylene are summarized. 8 references, 1 figure.

10380 **(LBL—16633) Molecular ion photofragment spectroscopy.** Bustamente, S.W. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 229p. NTIS, PC A11/MF A01. Order Number DE84003299.

Portions are illegible in microfiche products; Thesis.

A new molecular ion photofragment spectrometer is described which features a supersonic molecular beam ion source and a radio frequency octapole ion trap interaction region. This unique combination allows several techniques to be applied to the problem of detecting a photon absorption event of a molecular ion. In particular, it may be possible to obtain low resolution survey spectra of exotic molecular ions by using a direct vibrational predissociation process, or by using other more indirect detection methods. The use of the spectrometer is demonstrated by measuring the lifetime of the O_2^+ ($^4\pi$/sub u/) metastable state which is found to consist of two main components: the $^4\pi$/sub 5/2/ and $^4\pi$/sub -1/2/ spin components having a long lifetime (~ 129 ms) and the $^4\pi$/sub 3/2/ and $^4\pi$/sub 1/2/ spin components having a short lifetime (~ 6 ms).

10381 **Photochemical studies of bis(dibenzoylmethanato)dioxomolybdenum.** Peterson, M.W.; Van Atta, R.B.; Richman, R.M. (Carnegie-Mellon Univ., Pittsburgh, PA). *Inorganic Chemistry;* **22**: No. 14, 1982-1985(6 Jul 1983).

We have observed the photochemistry of bis(dibenzoylmethanato)dioxomolybdenum(VI), $MoO_2(DBM)_2$, at 380 nm in 1,2-dichloroethane at 23°C. The primary photoprocess is loss of ligand to form MoO_2(DBM) and DBM. The quantum yield for loss of $MoO_2(DBM)_2$ exhibits apparent Stern-Volmer behavior without addition of any quencher: this is attributed to a back-reaction that regenerates $MoO_2(DBM)_2$. Quantum yield extrapolated to zero time is 0.097. Ideas concerning the identify of the ESR-active molybdenum-containing photoproduct are discussed.

4006 Radiation Chemistry

10382 **(AD-A—131864/1) Radiolysis of resist polymers. 1. Poly(methyl-alpha-haloacrylates) and copolymers with methylmethacrylate. Technical report.** Babu, G.N.; Narula, A.; Hsu, S.L.; Chien, J.C.W. (Massachusetts Univ., Amherst (USA). Materials Research Lab.). Aug 1983. 45p. (TR—1). NTIS, PC A03/MF A01.

Methyl alpha-chloroacrylate (MCA) and methyl alpha-bromoacrylate (MBA) were copolymerized with methyl methacrylate (MMA) over a broad range of composition. The copolymers were exposed to gamma-radiation to determine chain scission susceptibility. The mechanisms of degradation of copolymers towards radiation was suggested from product analysis. The radiolysis of copolymers of MMA with MCA and MBA are dominated by the alpha-halogenated monomers.

10383 **(AD-A—132032/4) Radiolysis of resist polymers. III. Copolymers of methyl-alpha-chloroacrylate and trihaloethylmethacrylates. Technical report.** Babu, G.N.; Lu, P.H.; Hsu, S.L.; Chien, J.C.W. (Massachusetts Univ., Amherst (USA). Materials Research Lab.). Aug 1983. 45p. (TR—3). NTIS, PC A03/MF A01.

Homopolymers of 2,2,2-trifluoroethyl methacrylate (TFEMA) and 2,2,2-trichloroethyl methacrylate (TCEMA) and copolymers with methyl alpha-chloroacrylate (MCA) of a range of composition were synthesized. Radiolysis of copolymers are initiated by dissociative electron capture by the halogen atom. GC-MS analysis of volatile products show that the poly(TFEMA) tend to depolymerize but not poly(TCEMA). Some of the polymers merit further investigations for E-beam or X-ray lithographic applications.

10384 **(FRNC-TH—1226) Contribution to the study of gamma radiolysis of 2-furyl butyl or substituted phenyl ketones in isopropanol.** El Dessouky Aly, M.M. (Toulouse-3 Univ., 31 (France)). Mar 1982. 139p. (In French). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84750338.

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The following ketones: 2-furyl butyl ketone (I), 2 furyl phenyl ketone (II), 2-furyl p-methylphenyl ketone (III) and 2-furyl p-methoxyphenyl ketone (IV) were synthesised and characterised. The yields of hydrogen and methane obtained during radiolysis of the mixtures ketones (I to IV)-2-propanol were determined. These yields are always lower than with pure 2-propanol. Radiolysis products for ketones (I) and (II) are studied. Analysis of radiolytic products were conducted by gas chromatography. Effect of radiation dose and ketone concentration is determined. Reaction mechanisms are studied.

10385 (INIS-mf—8663, pp 19) **Physico-chemical processes in electron beam irradiated gases.** Cooper, R. (Melbourne Univ., Parkville (Australia). Dept. of Physical Chemistry). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

10386 (INIS-SU—186, pp 67-70) **Processes of radiation damage formation in monocrystals of α and β alanine.** Shul'ga, S.Z.; Onishchuk, V.A. (AN Ukrainskoj SSR, Kiev. Inst. Yadernykh Issledovanij). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

4007 Radiochemistry And Nuclear Chemistry

REFER ALSO TO CITATION(S) 10808, 10809, 10811, 10823

10387 **(INIS-mf—8634) Some aspects of the organic, biological and inorganic chemistry of astatine.** Visser, G.W.M. (Amsterdam Univ. (Netherlands)). 29 Sep 1982. 129p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704745.

Astatine has no stable isotopes and the radioactive isotopes with half-lives sufficiently long for chemical experiments (^{209}At, ^{210}At, ^{211}At) must be produced artificially with a cyclotron or with a high energy accelerator by spallation of Th. This thesis deals with the synthesis and chemistry of At-compounds and the determination of some of their properties. (C.F.).

10388 **Thermodynamic binding constants for gallium transferrin.** Harris, W.R.; Pecoraro, V.L. (Univ. of California, Davis). *Biochemistry;* **22**: No. 2, 292-299(18 Jan 1983). Contract AC03-76SF00472.

Gallium-67 is widely used as an imaging agent for tumors and inflammatory abscesses. It is well stablished that Ga^{3+} travels through the circulatory system bound to the serum iron transport protein transferrin and that this protein binding is an essential step in tumor localization. However, there have been conflicting reports on the magnitude of the gallium-transferrin binding constants. Therefore, thermodynamic binding constants for gallium complexation at the two specific metal binding sites of human serum transferrin at pH 7.4 and 5 mM $NaHCO_3$ have been determined by UV difference spectroscopy. The conditional constants calculated for 27 mM $NaHCO_3$ are log K_1^* = 20.3 and log K_2^* = 19.3. These results are discussed in relation to the thermodynamics of transferrin binding of Fe^{3+} and to previous reports on gallium binding. The strength of transferrin complexation is also compared to that of a series of low molecular weight ligands by using calculated pM values (pM = -log $[Ga(H_2O)_6]$) to express the effective binding strength at pH 7.4.

10389 **Preparation of nuclear accelerator targets by vacuum evaporation.** Maier, H.J. (Sektion Physik Universitat Munchen, D-8046 Garching). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1576-1583(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A powerful method to prepare thin film nuclear accelerator targets is the procedure of vacuum evaporation-condensation. In the present paper the physical and technological background of this method is discussed and the construction of suitable evaporation systems and related equipment is displayed. Different sublimation techniques including resistance-, induction- and electron beam heating as well as ion beam sputtering are described considering their specific benefits and disadvantages. Particular attention is paid to the collection efficiency of these various techniques in view of the low abundance and high cost of isotopically enriched target material. Since in many cases a target backing severely disturbs the actual measurement, emphasis is also given to procedures yielding unsupported high purity targets. In addition, special techniques for preparation, handling and storage of chemical reactive targets and of radioactive targets are discussed. Finally the preparation of single crystal thin film targets is briefly mentioned as well as target preparation by chemical vapour deposition, which in a physical sense is closely related to the vacuum evaporation-condensation method.

10390 **The preparation of stable and actinide nuclide targets for nuclear measurements.** Glover, K.M.; Bint, L.; Gayther, D.B.; King, M.; Whittaker, B.; Wiltshire, R.A.P. (Chemistry Division Bldg. 10.30, U.K.A.E.A., A.E.R.E., Harwell, Oxon, OX11 ORA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1593-1596(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Specifications for isotopic targets of both stable and actinide nuclides for nuclear measurements are very varied and individually very stringent. The majority of the targets are required to be of specified isotopic and chemical purity, well characterised and uniformly deposited over a precisely defined area. Mass assay of actinide targets may be requested to an accuracy of + or - 0.1%, resolutions of <10 KeV FWHM may be requested for infinitely thin alpha sources and the Schmidt and Pleasonton criteria must be met for ^{252}Cf fission fragment energy calibration sources. In order to cater for this wide range of requirements it is necessary to have available many preparation and calibration techniques. Actinide sources with activities in the range 0.01 μCi to several hundred

mCi and targets up to a few mg/cm² are prepared by one of the following techniques, vacuum evaporation, painting, electrodeposition or the use of TEG as a spreading agent. These targets may be assayed quantitatively by absolute alpha counting and weighing and qualitatively by alpha spectrometry. Stable isotope targets with thickness varying from a few μg/cm² to several hundred mg/cm² are prepared primarily by vacuum evaporation and rolling. Mass assay is to + or - 10% or better, the achievable accuracy being a function of substrate and target thickness. Activities of particular interest include the preparation of fission foils to be used in a series of flux inter-comparison measurements being organised by the Bureau International des Poids et Mesures, the preparation of stable isotope alloy foils for Mossbauer studies and the preparation of actinide targets on thin substrates.

4008 Combustion, Pyrolysis, And High-temperature Chemistry

REFER ALSO TO CITATION(S) 9414, 10379, 10654

10391 **(LBL—16828) Numerical simulation of flame propagation in a closed vessel.** Sethian, J.A. (Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 11p. (CONF-8310225—1). NTIS, PC A02/MF A01. Order Number DE84004959.

From 5. GAMM conference on numerical methods in fluid mechanics; Rome, Italy (5 Oct 1983).

We present a numerical simulation of a flame propagating in a swirling, premixed, combustible fuel inside a closed vessel. The model we approximate is appropriate for viscous, turbulent combustion, and includes the effects of exothermic volume expansion along the flame front. The method, which is particularly suited for flow at high Reynolds number, uses random vortex element techniques coupled to a flame propagation algorithm based on Huyghen's principle. We analyze the various effects of pressure, boundary conditions, exothermicity and viscosity on the speed and shape on the burning flame.

10392 **(LRAP—22) Applications of laser techniques for combustion studies.** Alden, M. (Tekniska Hoegskolan, Lund (Sweden). Fysiska Institutionen). [nd]. 158p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83751402.

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This work deals with the applicability of laser spectroscopy techniques for studies of combustion processes, both what regards in-flame experiments, exhaust-gas analysis and remote sensing of the atmosphere. Raman spectroscopy has been used for analysis of exhaust gases from flames, model fires of wood and for inflame measurements. Coherent anti-Stokes Raman Spectroscopy CARS, has been used for detection of several flame constituents e.g. O_2, CO, H_2O, CH_4 and H_2. Flame temperatures are measured using CARS spectra from N_2 molecules. The CARS technique has also been used for simultaneous detection of several species e.g. N_2/CO, CO_2/O_2 and CO/H_2. The applications of broadband rotational CARS have also been demonstrated in non-flame gases, whereas scanning rotational CARS has been used for flame experiments. Laser-induced fluorescence LIF is especially attractive for radical detection, and LIF spectra for several flame radicals are presented, e.g. OH, CN, CH and C_2 as well as relative concentration profiles for different radicals as a function of height above the burner. Special emphasis has been paid to space-resolved detection of radicals in flames, e.g. OH using a diode array detector. In a refined experiment, both C_2 and OH were spatially detected using two laser systems. Two-photon excitation is a rather new and fascinating approach for detection of flame species that absorb in spectral regions not accessible for laser sources. In this way oxygen atoms have been detected in an acetylen/oxygen flame. Closely connected to combustion studies using laser methods is remote sensing of pollutants in the atmosphere using laser techniques. These techniques have been used for laboratory experiments and in real-world measurements. E.g., NO has been detected using long-path absorption, whereas remote detection of Hg atoms has been performed using the dial technique.

10393 **(NP—4770124) Comparison of the picture of the intensity of radiation of a flame obtained by a television camera with intensity picture obtained from temperature and concentration measurements.** Kang, A.L. (Stuttgart Univ. (Germany, F.R.)). 11 Feb 1982. 145p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770124.

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Investigations for the application of the TV equidensities process to monitor flames were carried out and particularly the relationship of the picture produced by the TV equidensities process with the operational parameters and the properties of the flame were considered. The equidensities were calculated after measuring the parameters soot and gas concentration and the boundary value (temperature of the wall of the combustion chamber, half space radiation etc.) in order to reconstruct the TV equidensites. The comparison of the experimentally and calculatorily obtained pictures yielded a good agreement.

10394 **Radiation measurement in flames and furnaces.** Emmerich, V. (Universitaet Karlsruhe, Germany). pp 889-897 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The knowledge of thermal radiation laws for combustion systems is necessary not only to determine the heat transfer from hot combustion gases to furnace walls or charge surfaces, but can also be used as a means to control burners or high temperature equipment. It is shown in which cases the concept of mean total emissivity coefficients will fail due to the spectral selectivity of the combustion gases. In particular, the Schmidt method and the mirror method, measuring the mean emittance and the mean temperature of a furnace cross-section will be discussed. Finally a radiation flux method is developed based on spectral absorption coefficients of CO_2, CO, and H_2O. It may easily be extended to other radiating gases or soot particles. This method is used to describe and analyze results obtained from the traversing method of total radiation measurements. 12 references, 9 figures.

10395 **Combustion characteristics of low- and intermediate-Btu gases.** Levy, A.; Putnam, A.; Merryman, E.L.; Arbib, H.A.; Rising, B.; Ball, D.A. (Battelle Columbus Labs., OH). pp 966-979 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—). Contract AC22-76ET10653.

From International gas research conference; London, UK (13 Jun 1983).

The flame properties of flashback velocity gradient, burning velocity, quenching distance and global kinetic parameters have been determined for low- and intermediate-Btu gas mixtures, and have been applied to the Zeldovich, Frank-Kamenetskii, Semenov burning velocity equation. Rate expressions developed from structure analysis of these flames are also correlated with global expressions for carbon monoxide, hydrogen and methane oxidation. Flame property measurements show that as the H_2/CO ratio increases the maximum flashback velocity gradient increases, the maximum burning velocity increases and minimum quenching distance decreases. Calculated and measured burning velocity measurements correlate very well for stoichiometric mixtures. Finally an analysis of laboratory flashback data as correlated with blowoff data obtained on an industrial burner shows the analysis can be effectively applied to larger burners and to a variety of gas-mixtures. 16 references, 9 figures, 2 tables.

42 ENGINEERING

4202 Facilities And Equipment

REFER ALSO TO CITATION(S) 9291, 9292, 9454, 10164, 10234, 10262, 11263, 11272, 11274, 11275, 11339, 11340

10396 **(AD-A—131857/5) Enthalpy - improved dielectric insulation for superconducting wires. Final report Jun 1980-Mar 1982.** Lawless, W.N.; Clark, C.F.; Arenz, R.W. (Lake Shore Cryotronics, Inc., Westerville, OH (USA)). May 1982. 150p. NTIS, PC A07/MF A01.

The purpose of this study was to investigate for the first time dielectric materials for enthalpy stabilization, the broad picture being that these materials would also serve as the dielectric-insulation coating. These new, inorganic materials resulted from basic research into the specific heats of ferroelectric-type materials at low and glass which leads to enhanced specific-heat properties in several cases. In a particularly noteworthy case (60% SC-1C ceramic + 40% 7570 glass), the composite has a much larger specific heat (approx. = 0.07 J/cu cm/K) than the bulk ceramic alone below 7 K. There is evidence that the low thermal conductivities of all the composites are due to Kapitza resistance, and suggestions are made for improving these conductivities.

10397 **(AD-A—131933/4) Seamless collapsible fuel tanks. Final report Mar 1982-Mar 1983 on phase 2.** Abbott, N.J.; Erlandson, R.E. (Albany International Research Co., Dedham, MA (USA)). Jul 1983. 15p. (G—80143). NTIS, PC A02/MF A01.

Twenty-Three by twenty foot (lay flat) pieces of tubular fabric were coated with polyurethane and fabricated into two 7500-gallon fuel tanks. The tanks were shipped to Arizona for filling and exposure testing.

10398 **(CEA-CONF—6778) Design and testing of a plutonium oxide transfer container.** Auchapt, P.; Arnal, T.; Ferlay, A.; Marchal, P. (CEA Etablissement de la Vallee du Rhone, 30 - Bagnols-sur-Ceze (France)). May 1983. 6p. (In English, French). (CONF-830528—65). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750318.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

Several studies have been undertaken in France in this area. For the program discussed here, an experimental prototype facility was set up at the CEA's Cadarache Nuclear Research Center. This unit was designed for filling and emptying large-capacity (25 kg) containers, and for connecting and disconnecting them with industrial facilities without the use of vinyl wrappers. This paper describes the facility and discusses its operating principles before presenting some of the significant results obtained during active testing.

10399 **(CEA-CONF—6779) Justification and crush tests compared with fall tests in relation to changes in existing regulations.** Chevalier, G.; Gilles, P.; Pouard, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France); CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1983. 16p. (In French, English). (CONF-830528—63). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750287.

From 7. international symposium on packaging and transportation of radioactive materials; New Orleans, LA, USA (15 May 1983).

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The I.A.E.A. regulations applied to validate type B packages in an accidental situation represent a perfectly logical simulation of what could happen during transport, for most packages: - collision at 47.8 km/h with a very rigid obstacle, - local damage of 9.8 times the mass in joules (150 mm diameter punch test). These accident levels are justified for packages weighing 1000 kg to 50000 kg (between the mass of a car and that of a very large loaded transport vehicles). Under 500 kg, the aggression level required by the regulations seems insufficient in comparison with possible accidents, and experience shows that the packages in service in France display a resistance capacity closer to probable accidents than the minimum requirements of the regulations. Above 50 tons and around 100 tons, it seems that the situation is reversed, the requirements of the regulations appear to be much more severe than the probable accidents, and when a large package is located, it would seem to be more important to be concerned with the damage that this package would cause to the civil works than the damage that it would itself suffer.

10400 **(DOE/ER/04938—5) Superconductivity in filamentary eutectic composites. Final technical report, June 1, 1978-May 30, 1983.** Zaitlin, M.P. (Dartmouth Coll., Hanover, NH (USA). Dept. of Physics and Astronomy). 1983. Contract AC02-78ER04938. 4p. (COO—4938-5). NTIS, PC A02/MF A01. Order Number DE84005167.

The results of work performed under this contract are summarized. They include the building of a low temperature laboratory, measurements on Th-Nb and Y-Nb filamentary eutectic composites, and calculation of the lower critical field in a composite system.

10401 **(DOE/ER/04938—T2) Critical field of an SNS junction.** Cowen, D.F.; Hartzell, M.I.; Zaitlin, M.P.; Lawrence, W.E. (Dartmouth Coll., Hanover, NH (USA)). Dec 1983. Contract AC02-78ER04938. 28p. NTIS, PC A03/MF A01. Order Number DE84005165.

We have computed the lower critical field H/sub cl/ of a superconductor-normal metal-superconductor sandwich as a function of normal metal thickness. The Ginzburg-Landau free energy functional is minimized by varying the order parameter while computing the magnetic field exactly by numerical means. Good agreement with Pb-Cd sandwiches is found with no adjustable parameters. Comparison is also made with a previous calculation of H/sub cl/ for the large thickness limit.

10402 **(DOE/ET/34014—11) Extended Fuel Burnup Demonstration Program. Transport considerations for transnuclear casks.** Planell, J.R.; Mason, M.; Guerra, G. (Transnuclear, Inc., White Plains, NY (USA)). 15 Dec 1983. Contract AC02-79ET34014. 118p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE84004476.

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This report describes Transnuclear, Inc.'s (TN) evaluation of the adequacy of TN's current casks for the transport of extended burnup fuel. Typical Westinghouse, Combustion Engineering, Babcock and Wilcox and General Electric fuel assemblies with initial enrichments ranging from 3.0% wt to 5.1% wt (PWR) and 3.1% wt to 4.3% wt (BWR) and assembly average burnups from 35,000 to 55,000 MWD/MTU and 30,000 to 50,000 MWD/MTU for PWR and BWR, respectively were considered. TN's current cask designs, TN-8L, TN-9 and PWR and BWR versions of the TN-12Y were reviewed to establish whether fuel dimensions and weights present any constraints. Highest permissible enrichments were established on the basis of criticality consideration for fully loaded and partially loaded casks. Shielding, heat rejection and fission gas release limits for the current cask designs were used to establish minimum required cooling times prior to transport or reduced number of assemblies for partial loadings. Analysis methods and assumptions used for the current cask designs were reexamined with a view towards improving the transport capabilities for extended burnup fuel by reducing excessive conservatism and refining models to be more representative of real physical situations.

10403 **(DP-MS—83-113) Robotics at Savannah River.** Byrd, J.S. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). 1983. Contract AC09-76SR00001. 14p. (CONF-8311114—1). NTIS, PC A02/MF A01. Order Number DE84003482.

From DOE robotics seminar (IMOG); St. Petersburg, FL, USA (30 Nov 1983).

A Robotics Technology Group was organized at the Savannah River Laboratory in August 1982. Many potential applications have been identified that will improve personnel safety, reduce op-

erating costs, and increase productivity using modern robotics and automation. Several active projects are under way to procure robots, to develop unique techniques and systems for the site's processes, and to install the systems in the actual work environments. The projects and development programs are involved in the following general application areas: (1) glove boxes and shielded cell facilities, (2) laboratory chemical processes, (3) fabrication processes for reactor fuel assemblies, (4) sampling processes for separation areas, (5) emergency response in reactor areas, (6) fuel handling in reactor areas, and (7) remote radiation monitoring systems. A Robotics Development Laboratory has been set up for experimental and development work and for demonstration of robotic systems.

10404 **(FERMILAB/TM—1228) Heat conduction thru supports between 300°K and 4°K.** Nicol, T.H. (Fermi National Accelerator Lab., Batavia, IL (USA)). Nov 1983. Contract AC02-76CH03000. 27p. NTIS, PC A03/MF A01. Order Number DE84005166.

Of fundamental importance in the design of any superconducting machinery is a reasonable prediction of the heat flow between the outside world at 300°K and a helium volume at roughly 4°K. As machines grow larger and energy costs higher the accuracy with which these estimates are made becomes more critical. Unfortunately, as cryogenic vessels become more complex so does the procedure for making estimates accurately.

10405 **(PB—83-262287) Hydraulic transport of limestone aggregates and colliery spoil.** Carleton, A.J.; French, R.J. (Warren Spring Lab., Stevenage (UK)). [nd]. 122p. NTIS, PC AE07/MF E07.

Alternatives to road transport are needed for aggregates and waste materials, and hydraulic transport is one possibility. Little was known about hydraulic transport of large particles so it was necessary to carry out tests on a large scale pipeline rig. Tests were done in 102, 157 and 207 mm pipes on the English Clays Lovering Pochin test rig at St Austell with 5-10, 14-20, 20-40, -5, -10, -20 and -40 mm limestones and a -50 mm colliery spoil. The effect of adding china clay and limestone filler to a narrow size range limestone was studied.

10406 **(UCRL—89986) Seismic upgrade of Building 311.** Freeland, G.E.; Sethi, M. (Lawrence Livermore National Lab., CA (USA)). 7 Nov 1983. Contract W-7405-ENG-48. 10p. (CONF-8307113—1). NTIS, PC A02/MF A01. Order Number DE84003246.

From 8. world conference on earthquake engineering; San Francisco, CA, USA (21 Jul 1983).

Building 311, a two-story, reinforced concrete structure, was originally designed and constructed per the earthquake requirements contained in the 1961 Uniform Building Code. A significant difference exists between today's aseismic building codes for new construction and the 1961 Uniform Building Code. Presented is a unique structural/architectural building upgrade involving external building buttresses, drilled piers, and sophisticated connection details for the earthquake protection of building occupants. Discussions will center on concept evaluations, structural member configurations, static analysis - checked and evaluated by the use of dynamic analysis, and connection details developed through state-of-the-art design and analysis information.

10407 **A 9.1-T iron-free Nb- Ti dipole magnet with pancake windings.** Gilbert, W.; Caspi, S.; Hassenzahl, W.; Meuser, R.; Peters, C.; Rechen, J.; Schafer, R.; Taylor, C.; Wolgast, R. (Lawrence Berkeley Lab., Univ. of Cal., Berkeley, CA 94720). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 2578-2580(Aug 1983). (CONF-830311—). Contract AC03-76SF00098.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

An eight-pancake Nb-Ti dipole magnet with bent-up ends and called D-10B has been built and tested. This magnet is a Nb-Ti version of a Nb_3Sn magnet designed to produce a 10-tesla dipole field in a 40 mm diameter aperture. The pancake design is used for the heavy 12,000 ampere Nb_3Sn cable because of the mechanical difficulty in winding such a heavy cable into the conventional nested cylindrical shell configuration with a 2″ inner winding diameter. The Nb-Ti version operates at 1.8 K in helium II, has superconducting cable half as thick as the Nb_3Sn cable, and operates at half the current (6,000 amperes) at 10 tesla. Both magnets are approximately one meter long. D-10B was tested from January 26 to February 2, 1983, and reached short-sample performance in both helium I and helium II after moderate training. The central field at 4.3 K is 7.0 tesla and at 1.8 K is 9.1 tesla. Ramp rate sensitivity and cyclic heating data were also measured.

10408 **Performance of cross-cooled desiccant dehumidifiers.** Mei, V.C.; Lavan, Z. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN). *Journal of Solar Energy Engineering;* **105**: No. 3, 300-304(Aug 1983).

A cross-cooled silica gel desiccant dehumidifier model was designed, built, and tested. The performance of the unit was studied as a function of the inlet process stream dew point, process stream and cooling stream flow rates, and regeneration stream temperature and dew point. The tests were also simulated by a computer program and were compared to the experimental results.

10409 **A new pipeline design for high-temperature fluids.** Quade, R.N.; Stanley, J.D.; Van Hagen, T.M. (GA Technologies Inc., San Diego, California). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1806-1811(Aug 1983). (CONF-830812—). Contract AT03-76SF70046.

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

Systems to transport high-temperature energy often use pipelines carrying high-temperature fluids, such as steam or a sensible-energy molten salt. Absorption of thermal expansion is a major consideration in high-temperature piping design. U-shaped loops commonly used to absorb expansion heavily penalize the transport system in both the total installed piping length and in pressure drop from the many 90-degrees bends required. A new design that markedly reduced both factors uses a zig-zag configuration with straight lengths of pipe followed by small angle bends. The new design allows pressure drops and heat losses to be maintained with smaller diameter pipes and less thermal insulation. Costs for zig-zag pipelines carrying steam and molten salt at 339° to 556° C are estimated to be 35% to 50% lower than costs for comparable U-loop pipelines. In a nuclear energy park application study, pipeline costs were reduced by 45%, representing a 20% reduction in total energy park capital costs.

10410 **Fluid pairs for advanced absorption cycles: selection methods and data requirements.** Ryan, J.D. (U.S. Department of Energy, Washington, DC). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1915-1920(Aug 1983). (CONF-830812—).

From 18. intersociety energy conversion engineering conference; Orlando, FL, USA (21 Aug 1983).

This paper presents a review of selection methods for new absorption heat pump fluids, including a comprehensive set of fluid characteristics for screening candidate fluids. These characteristics include thermal and physical properties, transport properties, chemical characteristics, design and economic considerations. Also presented is a worldwide review of the new fluids and advanced cycles currently being researched. Based on these reviews, an assessment is made of the fluid property data requirements and costs needed to support advanced absorption system research and the implications for research managers.

10411 **Experimental parameter study of subsize Nb_3Sn cable-in-conduit conductors.** Steeves, M.; Hoenig, M. (MIT Plasma Fusion Center Cambridge, MA 02139). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **19**: No. 3, 374-377(May 1983).

An experimental study of the influence of design parameters on the short sample critical current of Nb_3Sn cable-in-conduit conductors at 4.2 K is presented. These internally cooled and cabled superconductors (ICCS) are subsized versions of the conductor used in both the Westinghouse Large Coil and 12 Tesla Programs.

Parameters investigated are cable compaction, conduit material, twist pitch and activation time and temperature. The results indicate that mechanical coupling between the conduit and cable has a strong effect on the residual strain of the Nb_3Sn and hence its superconducting properties.

10412 **Low frequency AC losses in multi filamentary superconductors up to 15 Tesla.** Orlando, T.; Braun, C.; Foner, S.; Schwartz, B.; Zieba, A. (Dept. of Electrical Engineering and Computer Science, MIT). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Magnetics;* **19**: No. 3, 435-438(May 1983).

Low frequency (1 Hz) ac losses were measured in a variety of A15 superconducting wires having different fiber geometries. Field modulations of≦ 1 tesla were superimposed on a fixed background field up to 15 tesla. Losses were measured for Nb_3Sn in continuous fiber, modified jelly-roll, In Situ, and powder metallurgy processed materials, and for Nb_3Al powder metallurgy processed materials. The results are compared with dc magnetization measurements. The losses are purely hysteretic at these low frequencies, scale with J /SUB c/ (above about 3 tesla), and are reduced substantially by twisting for all the materials. The lowest losses are observed for the Nb_3Al wires.

10413 **The METC prototype lockhopper valve testing and development program review.** Ayers, W.J. Jr. (U.S. Department of Energy, Morgantown Energy Technology Center, Morgantown, West Virginia). *American Society of Mechanical Engineers, [Paper];* **83-AES-1**: 8(1983).

The U.S. Department of Energy, Morgantown Energy Technology Center (METC) developed the Lockhopper Valve Test and Development Program to identify and test existing commercially available (state-of-the-art) valves for lockhopper service which is known as the State-of-the-Art (SOA) Lockhopper Valve Test and Development Program. In conjunction with the SOA Program, METC also commissioned the design and building of two new lockhopper valves which became known as the Prototype Lockhopper Valve Testing and Development Program. The purpose of the Proto type Program was to develop and manufacture valves with a capability to operate at higher levels of pressure and temperature and exceed cycle life of existing state-of-the-art valves. Based upon competitive bid and conceptual designs, contracts were awarded to Consolidated Controls Corporation for a ceramic-based gate valve and Fairchild Control Systems Company for a metal alloy segmented-ball valve. Each contractor was to develop and manufacture a specified number of valves to submit for testing in the METC valve test facilities. This paper provides a review and test results of the Prototype Valve Test and Development Program.

10414 **Device for underwater cryogenic cutting.** Elkins, J.H. US Patent Application 6-453,068. 27 Dec 1982. 13p.

An underwater cutting or penetrating device includes a source of liquid nitrogen for cooling a workpiece to a cryogenic temperature before impact by an explosively driven member. Attachment by magnet or clamp, and provision for confining the coolant by flexible gasket or boot are described.

10415 **The effect of parasitic refrigeration on the efficiency of magnetic liquefiers.** Barclay, J.A.; Stewart, W.F. (Los Alamos National Laboratory, Los Alamos, New Mexico). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **3**: 1166-1171(Aug 1982). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Studies by the authors have shown that magnetic refrigerators have the potential to liquefy cryogens very efficiently. High efficiency is especially important for liquid hydrogen and liquid natural gas applications where the liquefaction costs are a significant fraction of the total liquid cost. One of the characteristics of magnetic refrigerators is the requirement for a high-field superconducting magnet. Providing a 4.2-K bath for this magnet will require a small amount of parasitic refrigeration at 4.2 K even though the rest of the liquefier may be at 110 K (liquid natural gas) or higher. For several different refrigeration power levels at 4.2 K, the authors have calculated the efficiency of the magnetic liquefier as a function of power, temperature and the 4.2-K refrigerator efficiency. The results show that if the ratio of the thermal load at 4.2 K to the main refrigeration power is 0.001 or less, the effect on the efficiency of the liquefier is negligible at all temperatures below room temperature provided the 4.2-K refrigerator efficiency is high.

10416 **The US chemical heat pump program--an overview.** Mezzina, A. (Chemical/Hydrogen Energy Systems Program, Materials Chemistry and Energy Conversion Division, Brookhaven National Laboratory, Associated Universities, New York). *International Journal of Ambient Energy;* **3**: No. 3, 137-140(Jul 1982).

A brief overview of the Chemical Heat Pump Program is presented. Program background, rationale, technology description, and research and development needs are addressed. Chemical heat pumps comprise reversible reactions which can be driven by low-grade heat. Thermal energy is absorbed in one direction and liberated in the reverse direction; thus, serving as a basis for system designs applicable to space conditioning or process heat management and offering the capability for high-density energy storage as an integral part of the system.

10417 **Experimental determination of the propagation pressure of circular pipes.** Kyriakides, S.; Babcock, C.D. (Department of Aerospace Engineering and Engineering Mechanics, University of Texas at Austin, Austin, TX). *American Society of Mechanical Engineers, [Paper];* **82-PVP-2**: 9(1982). (CONF-820601—).

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

Local geometric imperfections on pipes under external pressure can lead to local buckling which under the "right" conditions can cause the initiation of a propagating buckle. This buckle, driven by the pressure, propagates up and down the pipe flattening it. The lowest pressure which can sustain a propagating buckle is called the propagation pressure and is a characteristic pressure of the pipe. Experiments have shown this pressure to be dependent on the post yield characteristics of the pipe material behavior, as well as the diameter-to-thickness ratio of the pipe. The collapse mechanism has been modeled by the collapse of a ring under external pressure. By identifying the lowest postbuckling pressure of the ring with the propagation pressure an empirical expression for the latter quantity has been established.

10418 **Seismic response of the flexible fluid-tank systems - a numerical study.** Ma, D.C.; Chang, Y.W.; Liu, W.K.; Seidensticker, R.W. (Argonne National Laboratory, Argonne, IL). *American Society of Mechanical Engineers, [Paper];* **82-PVP-6**: 12(1982). (CONF-820601—).

From ASME pressure vessel and piping conference; Orlando, FL, USA (27 Jun 1982).

Current practice in the seismic design of liquid storage tanks is reviewed. Significant numbers of failures in tanks designed under past practices suggest the need to examine more closely the assumptions made in the design and the resulting predicted behavior versus the actual, observed behavior. A coupled fluid-structure finite element method is presented for the seismic analysis of flexible fluid-tank systems. A detailed parametric study is then developed. It is found that the hydrodynamic forces in flexible tanks may be substantially greater than those predicted when the tank walls are assumed to behave as rigid bodies.

10419 **Steady state simulation of a single tube-finned condenser heat exchanger.** Anand, N.K.; Tree, D.R. (Ray Herrick Laboratories, School of Mechanical Eng., Purdue Univ., West Lafayette, IN). *ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transactions;* **88**: 185-200(1982).

A steady state simulation scheme is presented for an externally finned single tube heat exchanger in which the outer fluid is air and inner fluid is a condensing refrigerant. This model is intended to be a tool for a detailed air conditioner and heat pump heat exchanger design and also a scheme for their optimization. Thermodynamic and flow properties of the refrigerant and temperature of the air flowing over the heat exchanger are predicted as a function

of distance using a finite difference method. Variations of the heat transfer coefficient and friction factor due to change of phase are included. Thermodynamic and flow properties of both the refrigerant and air must be specified at the entrance of the heat exchangers. Although experimental results were not available for comparison, the predictions of the simulation program were found to be consistent with the physics of the system.

10420 **Stability of superconductors in helium I and helium II.** Paris, France; Institut International du Froid (1981). vp. (CONF-811140—).

From Workshop on stability of superconductors in He-I and He-II; Saclay, France (16 Nov 1981).

Separate entries were made in the data base for the papers included. (WHK)

10421 **An analysis of evidence for superconducting energy gap and pairing interaction anisotropy for two types of experiments.** Gregory, W.D.; Grekas, A.J.; Horn, S.; Morelli, L. (Georgetown Univ., Washington, DC). pp 265-282 of Anisotropy effects in superconductors. Weber, H.W. (ed.). New York, NY; Plenum Publishing Corporation (1977).

While there is a large body of evidence that the pairing interaction and energy gap in superconductors are anisotropic, there is also some inconsistency in many of the measurements of these quantities. In this paper the results of two kinds of experiments, that have been performed over the last decade, to measure possible anisotropy of the energy gap and pairing interaction in superconducting systems are reviewed. These two techniques are (a) measurement of the shift in critical temperature due to removal of anisotropy by boundary scattering in single crystals or in well annealed polycrystalline foils, and (b) measurement of the energy gap via tunneling into single crystals of gallium.

4203 Lasers

REFER ALSO TO CITATION(S) 10337, 10496, 11317, 11331

10422 **(BNL—33986) Proposal for a free electron laser in the x-ray region.** Colella, R.; Luccio, A. (Purdue Univ., Lafayette, IN (USA). Dept. of Physics; Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 10p. (CONF-8309118—6). NTIS, PC A02/MF A01. Order Number DE84004735.

From Topical meeting on free electron generation of extreme ultraviolet coherent radiation; Upton, NY, USA (19 Sep 1983).

It is proposed that a free electron laser can be operated in the x-ray region, in the range 2 to 3 Angstroms. An analysis is presented of the machine parameters and the characteristics of the mirrors that are required for operation in the Angstrom region. 13 references, 2 figures.

4204 Heat Transfer And Fluid Flow

REFER ALSO TO CITATION(S) 9236

10423 **(CEA-CONF—6728) Three-dimensional solution of the Navier-Stokes equations by means of a finite element method.** Magallon, D. (CEA Centre d'Etudes Nucleaires de Cadarache, 13 - Saint-Paul-les-Durance (France)). Sep 1982. 15p. (In French). (DRNR-P—244; CONF-8209119—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750323.

From International symposium on detailed modelization of fluid flow; Paris, France (7 Sep 1982).

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The influence of the mesh generation, in the case of a three-dimensional laminar flow at the entrance of pipes, is studied. The study is carried out for a square or circular section. An application with the same type of flow in a seven tubes array is presented for two different meshes. The results are presented in the case of a parallelepipedal cavity of which a side has a uniform movement of translation in a plan.

10424 **(CONF-840201—7) Laminarization effects on the dynamics of a disk levitated by incompressible fluid flow.** Warinner, D.K.; Pearson, J.T. (Argonne National Lab., IL (USA); Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering). 1984. Contract W-31-109-ENG-38. 13p. NTIS, PC A02/MF A01. Order Number DE84003612.

From ASME energy sources technology conference and exhibition; New Orleans, LA, USA (12 Feb 1984).

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This paper develops a nonlinear ordinary differential equation of motion for a disk parallel to a flat plat and levitated by incompressible turbulent fluid flow supplied from a central orifice. The transient flow-velocity and pressure-field for the turbulent flow are found by integrating the time-averaged Navier-Stokes equation with power-law velocity and shear stress correlations. The results for the turbulent film are coupled with the authors' recently published study of inertia effects on the dynamics of a disk levitated by incompressible laminar flow to determine the results for a laminarizing flow. The transient pressure field is then integrated to use in Newton's second law to determine the O.D.E. for the height of the disk (or its fluid film thickness) as a function of time when the disk is perturbed from its equilibrium state by a forcing function. The theoretical magnitudes, frequencies, and damping coefficients of oscillation are shown to be within 8% of those measured. The cases of highest inertia are predicted within 13%. Fortunately, the numerical solution differs only slightly from the linearized solution; the latter provides relatively accurate closed-form expressions for the frequencies and damping coefficients in terms of the geometry, load (or weight of disk), mass flow rate, and the fluid properties.

10425 **(DOE/ER/12022—2) Heat transfer in oscillatory flow. Progress report, January 1983-December 1983.** Telionis, D.P.; Diller, T.E. (Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)). 1983. Contract AS05-82ER12022. 39p. NTIS, PC A03/MF A01. Order Number DE84005193.

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Progress is reported in work with a water tunnel facility and wind tunnel facilities used to study heat transfer in oscillatory flow. Work on both facilities include construction and modifications of the facilities themselves, instrumentation and data acquisition, and experimental measurements. A computer code was developed for the calculation of steady and unsteady heat transfer over the attached portion of the boundary layer. The equations of momentum and energy were recast in their finite-difference form. (LEW)

10426 **(DOE/ER/12033—T1) Numerical study of heat transfer in turbulent shear flow.** Circelli, B.R.; McLaughlin, J.B. (Clarkson Coll. of Tech., Potsdam, NY (USA). Dept. of Chemical Engineering). 1984. Contract AC02-82ER12033. 21p. NTIS, PC A02/MF A01. Order Number DE84005106.

We present results for the heat flux and the intensity of temperature fluctuations obtained by solving a modification of the forced convection equation in which a mixing length profile is imposed on the spanwise and longitudinal average of the temperature field for points lying outside the wall region. The results for steady turbulent flow are shown to be in good agreement with the available experimental data. We also present results for unsteady turbulent flow which indicate that the heat flux exhibits a strong phase dependence.

10427 **(DOE/PC/50796—T3) Diffusion of gases in porous solids: simulations and measurements. Fifth quarterly technical proogress report, July 16, 1983-October 15, 1983.** Evans, J.W. (California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering). 1983. Contract FG22-82PC50796. 9p. NTIS, PC A02/MF A01. Order Number DE84004146.

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This quarter the experimental apparatus, which measures gas flux through a porous plug, has been successfully used to measure the viscosity of argon, nitrogen and carbon dioxide and also the diffusivity of the argon-carbon dioxide and nitrogen-carbon dioxide gas pairs over a range of elevated temperatures.

10428 **(NP—4770105) Heat and mass transfer in turbulent boundary layers along evaporating rippled water films.** Sill, K.H. (Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Maschinenbau). 16 Jul 1982. 181p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE84770105.

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This paper reports about investigations of the surface structure of flowing liquid films and their effects upon the heat and mass transfer within the boundary layer of the gaseous phase. An optical measuring procedure has been developed for the determination of the local film thickness. On a plane test model with the flow passing on both sides, the average rates of mass transfer of evaporating, turbulent water films are measured, as well as the velocity and temperature profiles within the air stream. The film is produced by means of a row of borings behind a short first section of air boundary layer. For the theoretical treatment of turbulent air-liquid film flow, a differential procedure proposed by Pantakas and Spalding has been used. Hereby the K, epsilon-model of turbulence gives the viscosity within turbulence in the flowing layers. The calculation procedure had to be extended to consider the sudden change of wall roughness with onset of the liquid film, as well as the coupled boundary conditions for temperature and mass concentration at the film surface during evaporation. With growing film mass flow, the transfer on the phase boundary between air and film liquid is enhanced and at low air temperature and just starting separation of drops reaches a 30% higher value than on a hydraulic ally smooth film surface. For the interfacial shear energy, increases up to 60% were found.

10429 **(NUREG/CR—3576) Measurement of phase distribution phenomena in a triangular conduit.** Sim, S.; Lahey, R.T. Jr. (Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Nuclear Engineering). Dec 1983. 164p. NTIS, PC A08/MF A01 - GPO $5.50. Order Number DE84900659.

Two-phase (air/water) measurements of phase distribution phenomena were made in a triangular test section. These measurements included the lateral void fraction distribution and the velocity profile of the liquid phase. In addition, measurements of the development length of the two-phase mixture were made. It was found that substantial void drift occurred, with the vapor phase collecting in the more open, high velocity, region of the test section.

10430 **(UCRL—15567) Transient gas flow along single or bundled electrical cables surrounded by a permeable medium.** Nilson, R.H. (S-Cubed, La Jolla, CA (USA)). Oct 1983. Contract W-7405-ENG-48. 65p. (SSS-R—84-6386). NTIS, PC A04/MF A01. Order Number DE84004791.

The analysis presented here provides a family of closed-form solutions which can be used to predict the penetration depth of cavity gas as it flows along a cable bundle surrounded by permeable cement. These solutions describe the transient behavior of a laminar or turbulent channel flow coupled with a Darcy or non-Darcy seepage flow. Cable-bundle flows were predicted to advance 80 to 120 metres within a minute or so, in reasonable agreement with field experience. Thus, the model seems to be useful in understanding the gross behavior of traditional stemming plans. Further analysis would be required to better model the hydrodynamic dispersion of radioactive gases, the confinement of the rock which surrounds the stemming column, and the overall gas-flow behavior within multilayer stemming plans which include fan-outs and plugs. The same basic model also describes the advance of cavity gas along a single cable surrounded by a low permeability stemming material such as cement or concrete. Even if the stemming sets tightly around each cable, mechanical deformation of the cable's insulation provides a narrow gap which can be gradually extended by the high pressure gas. However, the predicted depth of penetration is only about 1 metre within the first minute or so, based on preliminary estimates of property data for the gypsum concrete which has been recently proposed as a replacement for some parts of LLNL stemming. In summary, the scoping analyses presented here suggest that: (1) cable-bundle flow is a probable explanation for early radiation arrivals observed with traditional stemming plans, and (2) gypsum concrete stemming in fan-out regions should effectively retard the vertical flow of the gas, in spite of the seepage along the cables. Experimental studies are planned to better characterize the gypsum concrete and to test the latter assertion.

10431 **(UCRL—89400) Numerical simulations of compliant material response to turbulent flow.** Buckingham, A.C.; Hall, M.S.; Chun, R.C. (Lawrence Livermore National Lab., CA (USA)). Dec 1983. Contract W-7405-ENG-48. 13p. (CONF-840133—4). NTIS, PC A02/MF A01. Order Number DE84004365.

From 11. aerospace sciences meeting; Reno, NV, USA (9 Jan 1984).

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Homogeneous and internally structured material coatings are studied numerically as candidates for drag and turbulence generated noise reduction on submersible hulls. Dynamic motions of compliant surfaces may conceptually interrupt random turbulent motions, reducing the turbulent interface stresses and absorbing turbulent energy, and consequently reducing the turbulence at the flow/coating interface. Time dependent, noninteractive, two and three dimensional Monte-Carlo turbulent pressure field models, interactive potential flow models, and interactive Navier-Stokes pseudo-spectral methods are used to represent the unsteady flow, while time-explicit finite element methods are applied to represent a variety of homogeneous layered, and internally structured material coatings. Attention is given to development and testing of an efficient but dynamically interactive fluid/solid interface coupling method, for two- or three-dimensional response simulations. The influence of added mass and of depth overburden on the material response in ocean water is discussed. Promising compliant material coatings include sandwiches of soft, homogeneous layers between thin, stiffer elastic materials and internally structured coatings combining streamwise ribs, spanwise voids and elastically deforming intervening stiffeners.

10432 **Statistical study of the grid zone behavior in a shallow gas-solid fluidized bed using a mini-capacitance probe.** Yutani, N.; Ho, T.C.; Fan, L.T.; Walawender, W.P.; Song, J.C. (Kansas State Univ., Manhattan). *Chemical Engineering Science;* **38**: No. 4, 575-582(1983). Contract AC21-81MC16310.

The behavior of the grid zone in a shallow-air-sand fluidized bed was studied by means of a mini-capacitance probe coupled with the on-line correlation technique. Experiments were carried out in a bed with a diameter of 203 mm. The bed had a height of 50 mm and was operated at different air flow rates. A perforated "plexiglas" plate with a hole diameter of 1.59 mm and a thickness of 9.53 mm was used as the distributor. The technique has been found to be effective in determining locally or microscopically the jet penetration depth and the dead zone height. The phenomeon of jetting in a shallow gas-solid fluidized bed is described semi-quantitatively.

10433 **Transient saturator performance.** Daniel, K.J.; Crapo, A.W. (General Electric Company, Corporate Research and Development, Schenectady, NY). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **79**: No. 225, 383-389(1983). Contract AC21-80ET14928.

A transient mathematical model of a packed column used to saturate gas has been developed. Predictions from this model are compared with steady state and transient experimental data from a pilot plant sized saturator. Agreement is excellent. Saturator transient response to changes in exit gas temperature are found to be extremely fast.

4205 Materials Testing

REFER ALSO TO CITATION(S) 9533, 9641, 9835, 9842, 9945, 10206, 10210

10434 **(CEA-CONF—6672) Nondestructive testing by neutron radiography, improvement of performance with cold neutrons.** Bayon, G.; Laporte, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 5p. (In French). (CONF-8305152—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750269.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

Generally industrial neutron radiography is carried out with thermal neutrons, but it is very interesting to use cold neutrons to change the attenuation and the contrast of many materials. This paper shows industrial areas of interest for cold neutron radiography and advantages of a neutron guide for this purpose. The main characteristics of the industrial neutron radiography associated with the ORPHEE reactor are described.

10435 **(CEA-CONF—6753) Inspection from outside of weld bead on tubes by gamma absorptiometry.** Heintz, L.; Lefevre, C.; Bergey, C. (CEA Centre d'Etudes de Bruyeres-le-Chatel, 92 - Montrouge (France)). Jul 1983. 14p. (In French). (CONF-8306148—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750293.

From 23. colloquium SPECTROSCOPICUM; Amsterdam, Netherlands (26 Jun 1983).

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In this method used when it is impossible to place the gamma source inside the tube, the gamma rays pass through the tube twice. The thickness of the weld bead is determined by only one coordinate of space: the polar angle in the plane of the weld. The method was tested with an uranium ring with machined defects. The position of the defects was determined with an accuracy of 1 degree and resolution is of the order of the tube thickness.

10436 **(CEA-CONF—6772) Improvement of sizing methods using focussed probes.** Birac, A.M.; Saglio, R.; Frappier, J.C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 17p. (In French). (CONF-830562—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750322.

From Specialist meeting on defect detection and sizing; Ispra, Italy (3 May 1983).

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Three methods are described; these three methods, using the advantages of focussed probes allow, used simultaneously according to the nature of the detected defects, to evaluate with a good accuracy the dimensions and the orientation of the real or artificial defects.

10437 **(CEA-CONF—6798) Use of phase and transit time of an ultrasonic signal for the characterization of plane defects.** Paradis, L.; Joffre, F.; Frappier, J.C.; Serruys, Y. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 6p. (In French). (CONF-8305152—7). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750285.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

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Orientation and size of plane or quasi plane defects, nonoriented in respect to the acoustic beam, can be estimated accurately using phase, signal transit time or edge intensity surge. Three experiments are presented.

10438 **(CEA-CONF—6800) Study of a multitransducer device by numerical simulation.** De Vadder, D.; Samain, E.; Saglio, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 6p. (In French). (CONF-8305152—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750278.

From 5. international congress on non-destructive control methods; Bordeaux, France (30 May 1983).

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Usual methods of acoustical holography are limited by one or more of the following difficulties: large number of transducers and electronics, bad signal to noise ratio poor reconstitution of flat defects. The proposed method is able to overcome those difficulties. This is obtained by reducing the reconstructed zone for each position of transducers. The device combines one focused sending transducer creating a narrow acoustical field with N receiving transducers, N being much smaller than in usual methods.

10439 **(INIS-mf—8286) Increased probability of failure detection by improving the signal-noise ratio during ultrasonic testing. Pt. 2. Austenitic welded joint and austenitic cast iron.** Klot, R. von; Sahm, A. (Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)). Apr 1980. 44p. (In German). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704762.

The s/n-ratio during ultrasonic testing of austenitic welded joints (e.g. vessel shell and reactor vessel wall of the BR) and of austenitic cast iron (fitting case) grows in the following order of the test head types: wide band angular test heads, SEL-test heads, focus test heads. The influence of the acoustic irradiation angle on the s/n is negligible. The s/n is higher for transversal waves than for longitudinal waves. The transducer dimensions have a considerable influence on the s/n. (RW).

10440 **(SKI-B—74-80) Updating of actual technique for ultrasonic testing of austenitic stainless materials and welds.** Lindholm, P.O.; Pers-Anderson, E.B. (Statens Kaernkraftinspektion, Stockholm (Sweden)). 6 Sep 1982. 60p. (In Swedish). (SA—20191-3). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704565.

The technique for ultrasonic testing of stainless austenitic steels and weldings has been studied and it has been brought to the latest standard. Many problems exist when testing, the most serious being the occurence of false indications and the damping of energy. Laboratory tests show that the detectors with transversal sound waves should be used for plane defects. Best results were achieved with a 45 degrees detector.

10441 **(UCID—19323-83-2) Mechanical Engineering Research Program. Quarterly progress report, April-June 1983.** Goldberg, A. (comp.). (Lawrence Livermore National Lab., CA (USA)). 9 Sep 1983. Contract W-7405-ENG-48. 46p. NTIS, PC A03/MF A01. Order Number DE84001085.

Progress is briefly discussed in: an acoustic microscope for surface characterization, automatic spherical surface characterization, a diamond turning machine, multilayer coatings, characterization of martensitic transformations using acoustic emission, early characterization of graphite composites by fiber testing, a methodology for predicting aging of polymers, solid geometric modeling, and multivariable systems analysis and design. (LEW)

10442 **A review of holographic nondestruction evaluation at Lawrence Livermore National Laboratory.** Boyd, D.M. (Engineering Sciences Division, Lawrence Livermore National Laboratory). *International Advances in Nondestructive Testing;* **9**: 159-176(1983). Contract W-7405-ENG-48.

Holographic nondestructive evaluation at Lawrence Livermore National Laboratory has been developed for simplified, repeatable and quantitative analysis. The objective of the development work has been to fulfill the needs of the programs for reliable holographic testing. As part of this work two laser holography laboratories have been equipped for application and development of holographic interferometry. The coincident viewing and illumination optical arrangement permits quantitative determination of displacement and strain from holographic interferograms. This work resulted in the development of holographic fringe data acquisition and analysis system for quantitative calculations. Future work will include further development of the quantitative analysis methods, as well as speckle interferometry techniques and pulsed holographic capabilities. The Nondestructive Evaluation Section's goal is to provide a means of technology transfer for materials evaluation. Holographic interferometry is one of the techniques being developed for the nondestructive evaluation of materials.

4206 Safety Engineering

10443 **(LBL—9143) Seismic Safety Guide.** Eagling, D.G. (ed.). (Lawrence Berkeley Lab., CA (USA)). Sep 1983. Contract AC03-76SF00098. 198p. NTIS, PC A09/MF A01. Order Number DE84000542.

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This guide provides managers with practical guidelines for administering a comprehensive earthquake safety program. The Guide is comprehensive with respect to earthquakes in that it covers the most important aspects of natural hazards, site planning, evaluation and rehabilitation of existing buildings, design of new facilities, operational safety, emergency planning, special considerations related to shielding blocks, non-structural elements, lifelines, fire protection and emergency facilities. Management of risk and liabilities is also covered. Nuclear facilities per se are not dealt with specifically. The principles covered also apply generally to nuclear facilities but the design and construction of such structures are subject to special regulations and legal controls.

4207 Vacuum Engineering

10444 **(FERMILAB/TM—1233) Helium leak detector improved sensitivity speed choke.** Juravic, F. (Fermi National Accelerator Lab., Batavia, IL (USA)). Dec 1983. Contract AC02-76CH03000. 7p. NTIS, PC A02/MF A01. Order Number DE84005160.

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To achieve the best of steady sensitivity of a leak detector and the best of opening the valve for quick clean up, a gate valve was installed with a predetermined hole drilled in the seat plate and positioned between a diffusion pump and pumping system isolation valve. The technique was tried on a mass spectromeer leak detector. (LEW)

10445 **(UCRL—89299-Rev.1) Vacuum outgassing of various materials.** Erikson, E.D.; Beat, T.G.; Berger, D.D.; Frazier, B.A. (Lawrence Livermore National Lab., CA (USA)). 20 Dec 1983. Contract W-7405-ENG-48. 21p. (CONF-831011—3-Rev.1). NTIS, PC A02/MF A01. Order Number DE84004812.

From American Vacuum Society symposium; Boston, MA, USA (31 Oct 1983).

A gas analytical system for measuring the evolved gases from materials during vacuum degassing is discussed. The outgassing data are based upon the throughput measurement and a computer-controlled quadrupole mass spectrometer allows the determination of residual gas species. A variety of materials have been tested in the as received condition at room temperature vacuum exposure. Test results are presented for materials such as chlorinated polyvinychloride (CPVC), low-density carbon foam and Monel knitted wire mesh (both of which could be used for the attenuation of electromagnetic or radio frequency interference), polyethylene (in the form of black pipe, sheet of various thicknesses, and as an electrostatically applied coating to metal substrates), as well as Parylene-N conformal coatings applied to CPVC, polyethylene, and stainless steel substrates.

4208 Electronic Circuits And Devices

REFER ALSO TO CITATION(S) 10625

10446 **(AD-A—131706/4) Program of research on microfabrication techniques for vlsi magnetic devices. Interim progress report 30 Sep 1981-29 Sep 1982.** Kryder, M.H.; Bauer, C.L.; Rayne, J.A.; Guzman, A. (Carnegie-Mellon Univ., Pittsburgh, PA (USA)). 1 Oct 1982. 264p. NTIS, PC A12/MF A01.

Means of fabricating, selectively modifying, and characterizing single crystal epitaxial garnet and amorphous magnetic thin films are being investigated with the intention of developing new materials and processes for magnetic devices including bubble, recording, magneto-optic, and micro-wave devices. Submicron ion unimplantable garnets have been developed for ion-implanted contiguous disk devices. A wideband ferromagnetic resonance spectrometer and a high resolution magneto-optic photometer were developed and used to measure the magneto-striction and crystalline anisotropy constants of these materials. It was found that ion implantation dramatically reduces the crystalline anisotropy field and that a large portion of the change in uniaxial anisotropy of garnets is produced by non-stress related mechanisms which became more important as bubble size is reduced. Transmission electron microscopy investigations of ion implanted garnets have revealed clearly observable changes in stress and structure produced by implantation. Amorphous magnetic materials have been developed which support submicrometer sized domains for bubble and magneto-optic device applications. A number of high density bubble devices have been designed and fabricated: 2-4 micrometers period ion-implanted contiguous disk devices, 4-8 micrometer period current-accessed devices, and 2-6 micrometer period current-accessed ion implanted devices with 4 to 16 times lower power dissipation than earlier current-accessed devices.

10447 **(AD-A—132687/5) Workshop on solid state switches for pulsed power, held January 12-14, 1983 at Tamarron, Colorado. Final report.** Portnoy, W.M.; Kristiansen, M. (Battelle Columbus Labs., Durham, NC (USA)). 31 May 1983. 370p. NTIS, PC A16/MF A01.

A Workshop on Solid State Pulsed Power Switching was conducted by Texas Tech U at Tamarron, Colorado, in January, 1983 for the US Army Research Office. The Workshop addressed the state-of-the-art in solid state switching, particularly semiconductor switches, and new solid state related switching concepts for pulsed power applications. An important objective of the Workshop was to establish research priorities. Group discussions were augmented by invited presentations. The principal topics included opening switches, high power closing switches, extremely fast rise-time closing switches and state transition switches; devices of particular interest were thyristors, avalanche switches and the optically triggered intrinsic switch. The invited papers, along with summaries of the Working Group discussions and recommendations, are presented in this report. A general summary, including suggested research topics, is included.

10448 **(AD-A—132881/4) Dielectric resonators for use in microwave and millimeter-wave gaas circuits. Memorandum report.** Spielman, B.E.; Heddings, H.E. (Naval Research Lab., Washington, DC (USA)). 2 Sep 1983. 36p. NTIS, PC A03/MF A01.

This report represents the results of an investigation of dielectric resonators to be processed in GaAs substrates for application to microwave and millimeter-wave monolithic integrated circuits. Zeroth-and first order analyses are described. These analyses are applied to dielectric resonator structures to be formed in GaAs substrate material by etching an annular gap in the substrate, thereby effectively leaving a circular cylindrical disc of dielectric material to function as a resonator. Plots of geometric parameter variations with frequency are provided for these resonator structures. Tables are presented to show specific resonant structures for frequency-scaled microwave and non-scaled millimeter-wave resonators. Results are discussed, conclusions drawn, and suggestions for further work set forth.

10449 **(DOE/ET/29069—T2) Evaluation of advanced technologies for power transformers. Final report, Part 2.** (General Electric Co., Schenectady, NY (USA). Electrical Systems and Technology Lab.; General Electric Co., Pittsfield, MA (USA). Power Transformer Dept.). Jun 1983. Contract AC01-77ET29069. 117p. NTIS, PC A06/MF A01. Order Number DE84004046.

Six-inch size models, with multiple samples wound concentrically, offer a reliable vehicle for achieving consistent performance of the proposed turn-to-turn insulation system. Construction and testing of a short-circuit test coil and preliminary theoretical analysis produced information indicating the advantage of the sheet-wound construction when subjected to short-circuit forces and exposed those areas needing attention during the Phase 1 program. Preliminary development of electromagnetic axisymmetrical finite element programs for calculating the magnetic field (and related parameters) and temperature (and related parameters) were initiated. These programs have been completed in the Phase 1 program. Parametric design studies on prototype and demonstration units to be evaluated in the Phase 1 program and work on the facilities and equipment needs for the manufacturing technology work in Phase 1 were completed and revealed no major difficulties. This work has helped considerably in preparing for the extensive work planned in Phase 1 on these technologies.

10450 **(DOE/ET/29191—T1) Investigation of the dielectric strength of epoxy insulators for compressed gas systems. Interim report, July 1975-June 1977.** Dakin, T.W.; Studniarz, S.A. (Westinghouse Research and Development Center, Pittsburgh, PA (USA)). 1977. Contract AC01-76ET29191. 135p. NTIS, PC A07/MF A01. Order Number DE84004765.

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Initially, the objective of this investigation was the development of a partial discharge test which was more sensitive than commonly used, which could be used as a reliable quality control test for eliminating defective insulators which might fail prematurely under service stresses. To reach this objective, it was necessary to determine the correlation between the partial discharge magnitude measured and the gas cavity size in the insulator, and the life of the insulator under voltage stress. Various factors such as temperature, mechanical stress, etc., which influenced the voltage life were also to be determined. During about the first year of the investigation, the test results gradually indicated that the voltage life or failure times under accelerated voltage endurance tests were not very reliably correlated with the measured partial discharge levels. As a result of the partial frustration of the initial objective of a reliable partial discharge quality control test, the investigation was redirected toward a voltage proof test - based on a determination of the voltage stress-failure time curve for the resin-electrode system. The test results showed a statistical distribution of failure voltages at a given time of a-c stress which seemed to be correlated with a distribution of failure times at a constant stress. Thus, if the correct mathematical relation of time to failure and stress is established, minimum failure stresses for short times of a-c voltage stress can be used to predict or anticipate minimum failure times at lower operating stresses.

10451 **(DOE/ET/29191—T2) Investigation of the dielectric strength of epoxy insulators for compressed gas systems. Final report.** Dakin, T.W.; Studniarz, S.A. (Westinghouse Electric Corp., Pittsburgh, PA (USA). Research and Development Center). [nd]. Contract AC01-76ET29191. 148p. NTIS, PC A07/MF A01. Order Number DE84005283.

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This investigation was initiated to improve the detectability of faulty cast epoxy insulators for spacing in high voltage compressed gas transmission lines and substations. It was thought that more sensitive and discriminating partial discharges could detect smaller cavities where partial discharges would occur and cause delayed breakdown in service. The original objective to detect cavities which might cause failure was shown to be practically unattainable, since cavities which might cause failure could be of so small an area that they were practically indetectable. The project then took a new course - to establish the stress-failure time cure for cast epoxy systems and to correlate the level of the stress-time curve with the magnitude of defects, notably tiny cavities, which reduced both the short time and long time dielectric strength. The results strongly support the hypothesis that for a given dielectric resin system that the stress-time curve is shifted up or down depending in an inverse fashion with the defect cavity size and directly with the partial discharge threshold stress. This has led to the conclusion that sufficiently high short time a-c proof test is capable of eliminating specimens which might fail eventually by internal discharges. It has also been shown that when the level of our overvoltage proof test is selected properly, it does not significantly reduce the voltage endurance at lower strsses. Such an overvoltage test would supplement a partial discharge test which it was shown can be improved.

10452 **(ITEF—143(1982)) Four of time-to-digital converters with a broad dynamic range.** Brakhman, Eh.V.; Sinyavskij, O.F. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1982. 9p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704186.

Time-to-digital converter with 0.5 ns operation in 4095 dynamic range is described; integrated nonlinearity: +-2 countings-deviation from the straight-line; differential nonlinearity <= 4%; the complete time interval equals 2 μs.

10453 **(TRITA-EPP—82-12) Negative resistance of double layers.** Raadu, M.A.; Silevitch, M.B. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Aug 1982. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704462.

It is known that large amplitude oscillations can occur in the current flowing through a plasma diode, typically when a constant potential is applied across the device. Burger (1965) suggested via a computer simulation that the oscillation characteristic was a function of the quantities T sub (e) and T sub (i), namely the respective time for an electron and an ion to cross the electric field region inside the diode. On the rapid time scale T sub (e) the self consistent equilibrium configuration was unstable. Norris (1964) had previously arrived at the same conclusion using analytical arguments. In that work, it was concluded that the instability occurred since the diode acted as a negative resistance on the T sub (e) scale. A positive feedback effect forced the system away from equilibrium. Silevitch (1981) used the Burger mechanism to suggest an explanation for the flickering aurora phenomenon. He extended the Norris argument and showed by a variational method that a plausible analytic model for a double layer (DL) behaved as a negative resistance on the T sub (e) scale. In this present work we re-examine the negative resistance calculation by taking a more detailed account of the constraints which are imposed on the electron distributions that exist in the DL region. Specifically, we shall focus at the high potential side of the DL.

10454 **(UCID—19925) Computer assessment of electromagnetic means of detecting approaching cruise missiles.** Burke, G.J.; King, R.J.; Lytle, R.J.; Miller, E.K. (Lawrence Livermore National Lab., CA (USA)). Nov 1983. Contract W-7405-ENG-48. 20p. NTIS, PC A02/MF A01. Order Number DE84005115.

Numerical modeling of Beverage and monopole antennas shows the fields of both antennas to have a similar dependence on range and height above ground, with the Beverage antenna having slightly greater gain in the forward direction due to its directivity. The use of multiple Beverage antennas closely spaced was found to increase the efficiency and gain in the forward direction for short Beverage antennas. For the longer antenna considered for the cruise missile radar, the decrease in directivity for two closely spaced antennas reduced the forward gain.

10455 **(UCRL—15568-2) Maintenance procedures for an electrical power distribution system .** (Brown and Root Development, Inc., San Francisco, CA (USA)). Oct 1983. Contract W-7405-ENG-48. 168p. NTIS, PC A08/MF A01. Order Number DE84003904.

This manual includes all electrical components that compose the required network for the distribution of electrical power within the Lawrence Livermore National Laboratory electrical system. Items included are transformers, cables, switchgear, motors, devices and hardware that conduct, distribute or use electrical power. System parameters begin at the point of connection to the supplying utility's system and terminate at the end use device. Generally the voltage levels to be included are 15KV, 5KV, and 480 VAC levels; however selected items of other ratings will also be included. Physical hardware items such as conduit, fittings, enclosures, supports and other similar components including area lighting are excluded.

10456 **(UCRL—89507) Physical modeling of EM propagation over nonhomogeneous terrain.** King, R.J. (Lawrence Livermore National Lab., CA (USA)). Jul 1983. Contract W-7405-ENG-48. 20p. (CONF-8310167—2). NTIS MF A01. Order Number DE84000178.

From NATO-AGARD lecture series number 131; Ankara, Turkey (19 Oct 1983).

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To obtain experimental data for comparison with the theoretical results obtained from mathematical groundwave propagation models, it is often expedient to conduct experiments on laboratory models using microwaves. Besides the obvious convenience and reduced cost, practical difficulties encountered in full-scale experi-

ments are avoided (e.g., weather and other uncontrolled parameters such as path nonhomogeneities, earth curvature, buildings, right-of-ways, etc.). There is no need to use exact similitude scaling; the media and geometries are generally chosen to test the limits of the theory's validity. The design of several such models in the frequency range of 4 to 5 GHz will be discussed, and the experimental results will be compared with the corresponding theory. Specific examples are propagation over planar and curved surfaces (including stratified media, e.g., layered earth, sea ice, etc.), mixed paths (including media having abrupt discontinuities such as land-sea boundaries, gradual nonuniformities such as sloping beaches, off-path discontinuities such as islands, lakes and peninsulas), uniaxially anisotropic media, and media having an index of refraction near unity such as heavy vegetation. When using such models, instrumentation systems and field probing techniques are key factors in their success. These will also be discussed.

10457 **(UCRL—89838) Modeling antennas near to and penetrating a lossy interface.** Burke, G.J.; Miller, E.K. (Lawrence Livermore National Lab., CA (USA)). 22 Sep 1983. Contract W-7405-ENG-48. 46p. (CONF-8310167—3). NTIS, PC A03/MF A01. Order Number DE84004785.

From NATO-AGARD lecture series number 131; Ankara, Turkey (19 Oct 1983).

In this paper, we describe a technique for modeling wire objects interacting across or penetrating the planar interface which separates two half spaces. The moment-method treatment is employed, based on the thin wire approximation to the electric-field integral equation, with the effect of the interface included via the usual Sommerfeld integrals. The computation time associated with evaluating the latter is substantially shortened by using an interpolation based technique plus asymptotic field expressions. Although developed specifically for the wire problem, the procedure is also applicable, with slight modification, to modeling surface objects as well. Special account is taken of the charge discontinuity that occurs at the point a wire penetrates the interface. Example calculations are shown for the antenna-ground stake problem; monopole antenna driven against a simple ground screen; the fields of buried objects; and a simple EMP simulator.

10458 **Numerical simulation of hot-electron phenomena.** Watanabe, D.S.; Slamet, S. (Dept. of Computer Science, Univ. of Ill., Urbana, IL 61801). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Electron Devices;* **ED-30**: No. 9, 1042-1049(Sep 1983). Contract AC02-76ER02383.

An accurate two-dimensional numerical model for MOS transistors incorporating avalanche processes is presented. The Laplace and Poisson equations for the electrostatic potential in the gate oxide and bulk and the current-continuity equations for the electron and hole densities are solved using finite-difference techniques. The current-continuity equations incorporate terms modeling avalanche generation, bulk and surface Shockley-Read-Hall thermal generation-recombination, and Auger recombination processes. The simulation is performed to a depth in the substrate sufficient to include the depletion region, and the remaining substrate is modeled as a parasitic resistance. The increase in the substrate potential caused by the substrate current flowing through the substrate resistance is also included. The hot-electon distribution function is modeled using Baraff's maximum anisotropy distribution function. The model is used to study hot-electron phenomena including negative-resistance avalanche breakdown in short-channel MOSFET's and electron injection into the gate oxide. The model accurately predicts the positive-resistance branch of the drain current-voltage characteristic and could, in principle, predict the negative-resistance branch and the sustain voltage.

4209 Waste Processing Plants And Equipment

REFER ALSO TO CITATION(S) 9592, 10488

4210 Combustion Systems

REFER ALSO TO CITATION(S) 9385, 9415, 10100, 10113, 10135, 10153, 10156, 10157, 10158, 10159, 10394

10459 **(CONF-8308147—1) Fluidization behavior of sticky particles.** Huang, C.S.; Arastoopour, H.; Weil, S.A. (Institute of Gas Technology, Chicago, IL (USA)). 1983. 22p. Institute of Gas Technology, 3424 South State St., ITT Center, Chicago, IL 60616.

From Fine Particle Society meeting; Honolulu, HI, USA (1 Aug 1983).

To obtain fundamental information on the fluidization behavior of sticky particles, a visually observable fluidized bed, which can be operated under conditions in which agglomeration of the bed materials occurs, was designed and constructed. Polyethylene particles with a softening temperature of 117.2°C and melting temperature of 124.4°C, in sizes from 850 to 50 μm, were chosen as the bed material. Two types of fluidizing gas distributors were used: a porous plate and a porous plate with an independently fed jet at the center. The agglomeration rate was measured at different jet and bed temperatures, particle sizes, and residence times in the fluidized bed. The amount of agglomerates generated increased linearly with residence time and increased exponentially with either auxiliary air or jet air temperature. The agglomerates were formed from the whole range of particle sizes, but fine particles enhanced the agglomeration rate. A set of operating conditions must be properly chosen; otherwise, excessive agglomeration can lead to catastrophic sintering and defluidization.

10460 **(DOE/ET/10389—T25) Industrial application of fluidized bed combustion. Progress report, January-September 1983.** (C-E Power Systems, Windsor, CT (USA)). 1983. Contract AC21-76ET10389. 11p. NTIS, PC A02/MF A01. Order Number DE84002778.

Work accomplished during a shut-down of the industrial fluidized bed (IFB) plant is reported, including: coal receiving and preparation; fuel feed system work; progress on boiler and gas side equipment. After completion of construction work and acid cleaning, the boiler was restarted. The performance of specific plant equipment during shakedown operation is reported. The performance of specific plant equipment during shakedown operation is reported. Operator training classes were conducted, and the final revision of a test plan was completed. (LEW)

10461 **(DOE/ET/15457—1447) Long term materials test program. Quarterly report, October-December 1982.** (General Electric Co., Schenectady, NY (USA). Advanced Energy Programs Dept.). 1982. Contract AC21-79ET15457. 27p. NTIS, PC A03/MF A01. Order Number DE84003063.

Four hundred hours of long-term material testing have been completed. The PFB combustor operated at 1650°F utilizing Pittsburgh No. 8 coal (3% sulfur, 0.06% chlorine) and Pfizer dolomite. After 285 hours, visual inspection of corrosion pins in the low velocity test section indicated that unprotected blade and vane alloys, IN-738, IN-939, U-500 and FSX-414 experienced significant corrosion attack at all three metal temperatures, 1500°, 1300° and 1100°F. Precious metal aluminide coatings showed good resistance to corrosion at 1500° and 1300°F, but appeared susceptible to attack at the 1100°F metal temperature. CoCrAlY and FeCrAlY overlay coatings were generally resistant to attack at all three temperatures, although some pitting attack was observed on CoNiCrAlY and FeCrAlY cladding at 1300° and 1100°F.

10462 **(DOE/MC/14129—1501) 20 atmosphere rig PFBC test results: Test 13, investigations into the use of two-stage air admission.** (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Sep 1983. Contract AC21-80MC14129. 59p. NTIS, PC A04/MF A01. Order Number DE84000229.

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A test has been carried out in the 20 atm 1 ft x 1 ft pressurized fluidized-bed combustor to investigate the effect on NO/sub x/ emission of two-stage air admission. Operating conditions were 16 and 10 atm pressure; 1560°F bed temperature; 4 ft/s fluidizing velocity related to the bed surface; and 13 to 70% overall excess air. Between 5% and 50% of the total air was admitted at a level 5.6 ft above the main distributor (bed height was c.9 ft) which meant that the nominal excess air in the bottom part of the bed varied between -33% (i.e. sub-stoichiometric) and +20%. Introducing the air in two stages slightly reduced NO/sub x/ emission (by about 20%). The reduction in NO/sub x/ emission was not, however, related to the proportion of the air supplied to the second stage. The reduction was no greater with strongly reducing than with slightly oxidizing conditions at the bottom of the bed. Data on combustion efficiency and sulphur retention are included in the report. Sulphur retention appeared to be improved by two-stage air admission, but combustion efficiency was slightly lower.

10463 (DOE/MC/14129—1502) 20 atmosphere rig PFBC test results: Tests 14 and 15, investigations with a coarse coal-water mixture. (National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.). Oct 1983. Contract AC21-80MC14129. 83p. NTIS, PC A05/MF A01. Order Number DE84000228.

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Tests have been carried out in the 20 atm, 1ft x 1ft, pressurized fluidized-bed combustor to investigate operation with a 70 : 30 coal:water mixture. The coal was Pittsburgh No. 8, crushed to a top size of 1/8 inch. Operating conditions were 16 atm pressure; 1385 to 1740°F bed temperature and 3 to 4 ft/s fluidizing velocity. The slurry was pumped into the bottom of the fluidized bed through a water-cooled nozzle, and a small amount of air was used to break the slurry into globules. The tests confirmed that feeding crushed coal as a slurry into a PFBC is commercially attractive from an engineering and control point of view. Sulphur retention and NO/sub x/ emissions were substantially the same as obtained in the same combustor at the same operating conditions when burning the same coal fed as a dry, crushed material. There were indications that combustion efficiency may have been higher with coal-water mixtures.

10464 (PB—83-260232) Combustion of refuse derived fuel in suspension. Douglas, E.; Poll, A.J. (Warren Spring Lab., Stevenage (UK)). [nd]. 26p. NTIS, PC AE04/MF E04.

The work involved in designing, commissioning and testing a combustion unit, for the suspension firing of RDF, is briefly outlined in this report. It describes the test facility and burner design as well as the test procedures adopted. Also it outlines the wide range of variables examined in developments leading to conditions which promoted autogenous combustion. Test results, including photographs of the unit, are presented and discussed in terms of possible industrial applications and the work outstanding before these can be implemented. (Copyright (c) Crown Copyright 1981.)

10465 (PB—84-102698) Long term optimum performance/corrosion tests of combustion modifications for utility boilers. Host site: Columbus and Southern Ohio Electric Company, Conesville No. 5. Final report Jan 1979-Nov 1981. Natanson, P.S. (Exxon Research and Engineering Co., Florham Park, NJ (USA)). Sep 1983. 346p. NTIS, PC A15/MF A01.

The report gives results of part of a study of corrosion in large utility boilers firing high-sulfur coal, as possibly affected by combustion modifications (CMs) for decreased nitrogen oxide (NOx) emissions. During the first part of this study, each boiler was characterized to learn the short term effects of various CMs on boiler operation and emissions. Later, a Level 1 environmental assessment (EA) of boiler operation was performed, followed by tests to measure corrosion rates in the furnace. For the nearly 2-year study, waterwall corrosion rates (measured ultrasonically) were similar to rates under normal operation at about 1-2 mils/yr.

10466 Corrosion in H.E.-boilers and analysis of flue gas condensate. Kobussen, A.G.C. pp 836-845 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

At VEG-GASINSTITUUT the influence of the flue gas condensate composition on the corrosion of High-Efficiency (H.E.) boilers for central heating has been studied by chemical analysis of 288 samples of condensate from 265 installations comprising 6 types of H.E.-boilers. The samples were analyzed for chloride, nitrate, nitrite, sulphate, aluminium, iron and chromium, and the pH and conductivity were measured. The ion concentrations were found to vary widely and were larger than expected. Statistical analysis proved the corrosion of aluminium to be controlled by chloride and nitrate; the corrosion of stainless steel was influenced only by chloride. The chloride found probably originates from indoor sources (e.g. spray propellants). The pH was found to be unsuitable for measuring the corrosiveness of flue gas condensate. From laboratory experiments with actual flue gas condensate aluminium and stainless steel were found to behave satisfactorily. A test method using condensate with an increased chloride concentration was developed. 6 references, 9 figures, 5 tables.

10467 Industrial applications of the radiant ceramic fiber burner. Schreiber, R.; Krill, W.; Kesselring, J.; Vogt, R.; Lukasiewicz, M. pp 898-908 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The progress of Alzeta Corporation in developing two new industrial applications for a radiant ceramic fiber burner is described. This patented burner uses premixed surface combustion to transfer most of its heat input by thermal radiation. Reasons for using the burner include improved radiant heat exchanger performance, lower noise, and reduced emissions of NO/sub x/ (due to the relatively low combustion temperature). Development of the first application, the industrial firetube boiler, began with the retrofit of a 245 kW boiler with a fiber burner. Laboratory testing showed an 85% NO/sub x/ reduction and a 2 percentage point efficiency increase. The boiler could also be overfired by 20% and could achieve a lower excess air level with no CO emissions. Development of the second application, an oil refinery process heater, began with the successful operation of a subscale burner on process gas. For both applications, planning is underway for field testing and eventual commercialization.

10468 Techniques for achieving more complete combustion in wood stoves. Allen, J.M.; Piispanen, W.H. (Battelle, Columbus, OH). pp 2-13 of Residential wood and coal combustion. Frederick, E.R. (ed.). Mars, PA; Publisher Choice Book Manufacturing Company (1982). (CONF-820353—).

From Speciality meeting on residential wood and coal combustion; Louisville, KY, USA (1 Mar 1982).

Secondary combustion has been shown previously to be very effective in reducing air pollution emissions from wood stoves, especially when it can be maintained during operation at high burning rates. In this study, several techniques have been investigated to promote effective secondary combustion in a small air-tight box stove operating at low burning rates. The design of the secondary air inlet system, quantity of secondary air admitted, and thermal insulation of the stove were studied experimentally. Carbon monoxide and total hydrocarbon emissions were monitored simultaneously in the gases leaving both the primary and secondary combustion zones. Air in-leakage thru joints in the primary chamber resulted in lower emissions, but prevented stove operation in a controlled manner at low burning rates. The thermal insulation of stove walls was relatively ineffective in promoting secondary burning, as primary air bypassing the burning wood cooled the combustion products to temperatures where additional burning was quenched. The carbon monoxide emissions from the primary combustion zone were more effectively consumed in the secondary combustion zone than the unburned hydrocarbons.

4220 Underground Engineering

REFER ALSO TO CITATION(S) 9291, 9292, 9293

10469 **(NP—4770097) Calculation of earth movements above cavern-like openings under consideration of the global volume convergence.** Schober, F. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 26 Nov 1982. 77p. (In German). NTIS (US Sales Only), PC A05/MF A01. Order Number DE84770097.

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Calculation models to set up the relationship between the hollow space convergency and the surface movement elements have been formulated. Initially the limiting case of the entirely closed cavern was studied by the maximal sinking for different forms of hollow spaces. Subsequently the influence of different behaviours of convergency on the surface movement structure was investigated. It was found that two real limiting models exist and that the effects of all other courses of movements can be localized by a restricted interval.

10470 **(NP—4770125) Fundamental investigations to analyse the strength parameters in the mining method with freezing stowing.** Fischer, H. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 11 Jun 1982. 137p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770125.

It is reported about investigations of frozen slurries from one preparation refuses and of frozen water-sand samples in order to determine and to analyse the most important parameters influencing the mechanical strength in the freezing filling process in the permafrost region. The influence of the characteristic of the ice matrix, namely the particle-ice union, on the mechanical strength of frozen slurries was investigated for the cases of hydrophilic and hydrophobic surface properties.

10471 **(NP—4770126) Rock burst prevention in the Ruhr mining with special regard to the destressing blasting.** Velsen-Zerweck, R. von. (Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen). 14 Jan 1983. 126p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770126.

The general knowledge in the rock burst prevention in the Ruhr mining and the operational organization of the rock burst prevention are presented. The presently used auxiliary devices for the operation are discussed particularly from the point of view of a practical and rational application. The decrease of the expenditure of operational measures and the easy arrangement of the testing and depressurization measures into the operation are indicated.

4230 Marine Engineering

REFER ALSO TO CITATION(S) 10414

4240 Pollution Control Equipment

10472 **(NUREG/CR—3242) Los Alamos National Laboratory/New Mexico State University filter plugging test facility: description and preliminary test results.** Fenton, D.L.; Dallman, J.J.; Smith, P.R.; Martin, R.A.; Gregory, W.S. (Los Alamos National Lab., NM (USA)). Oct 1983. Contract W-7405-ENG-36. 25p. (LA—9929-MS). NTIS, PC A02/MF A01 - GPO. Order Number DE84005155.

A facility to test the plugging effects of combustion products on high-efficiency particulate air filters has been constructed. This facility can supply experimental data to support pressure-drop models of filter plugging under fire accident conditions, which are needed for use in an existing fire accident analysis computer code. The test facility includes a specially designed null-balance filter-weighing system. The resolution of this system is approximately 2 to 3 g out of 14 kg for a commercial 0.6- by 0.6-m filter. Using this system, commercial filters can be tested to provide data with which to correlate pressure drop and smoke aerosol mass accumulation and flow rate. Some recently accomplished tests and future test plans are discussed. 12 references, 12 figures, 2 tables.

10473 **(UCID—19952) Electric air filtration: theory, laboratory studies, hardware development, and field evaluations.** Bergman, W.; Biermann, A.; Kuhl, W.; Lum, B.; Bogdanoff, A.; Hebard, H.; Hall, M.; Banks, D.; Mazumder, M.; Johnson, J. (Lawrence Livermore National Lab., CA (USA)). Sep 1983. Contract W-7405-ENG-48. 298p. NTIS, PC A13/MF A01. Order Number DE84004668.

We summarize the results of a seven-year research project for the US Department of Energy (DOE) to develop electric air filters that extend the service life of high-efficiency particulate air (HEPA) filters used in the nuclear industry. This project was unique to Lawrence Livermore National Laboratory (LLNL), and it entailed comprehensive theory, laboratory studies, and hardware development. We present our work in three major areas: (1) theory of and instrumentation for filter test methods, (2) theoretical and laboratory studies of electric air filters, and (3) development and evaluation of eight experimental electric air filters.

4250 Power Cycles

REFER ALSO TO CITATION(S) 10180

10474 **Free-piston Stirling engine.** Berggren, R.W.; Moynihan, T.M. (Stirling Engine Systems Division, Mechanical Technology Incorporated, Latham, New York). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1885-1893(Sep 1982). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

A free-piston Stirling engine/linear alternator system (FPSE-010-3), developed under previous Department of Energy (DOE) funding, has been used as a test bed for evaluating selected Stirling engine loss mechanisms. The engine is particularly suited to test-bed operation because engine performance can be evaluated over a wide range of operating conditions; system instrumentation is capable of measuring the effects of system component changes; and modular engine design facilitates the evaluation of alternate component configurations. Extensive testing was performed to establish the operating characteristics of a base-line engine configuration and to characterize specific losses within a Stirling engine. Significant variations in engine performance were observed as the displacer seal clearance was varied. This paper presents selected results from the base-line and displacer seal clearance tests.

10475 **A user oriented design system for Stirling cycle codes.** Heames, T.J.; Daley, J.G.; Uherka, D.J.; Zabel, J. (Argonne National Laboratory, Argonne, IL). *Proceedings, Intersociety Energy Conversion Engineering Conference;* **4**: 1681-1687(Sep 1982). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

Researchers and developers of Stirling cycle technology have need of well documented validated, user-oriented computer codes that are sufficiently general to be easily adapted to the engine configuration of interest and are written to be compatible with mini computer systems of limited capacities as well as large systems. This paper describes an analysis code which will be available to requestors either free or at nominal cost through the National Energy Software Center. A users manual will be provided with a copy of the code and support provided to users needing further information or encountering difficulties. The analysis method follows that presented in his Thesis by P. Rios and is intended to accurately account for energy flows through the system while requiring little execution time. The code contains generalized input and output modules which assist the user in specifying the system to be examined and in obtaining desired information. Future code releases which provide additional analysis capability will also use these general modules. Calculations from the present code are shown with comparisons against experimental data.

10476 **A new, versatile Stirling energy conversion unit.** Meijer, R.J.; Ziph, B. (Stirling Thermal Motors, Inc., Ann Arbor, Michigan 48104). *Proceedings, Intersociety Energy Conversion Engineering Conference;* 4: 1801-1806(Aug 1982). (CONF-820814—).

From 17. Intersociety Energy Conversion Engineering conference; Los Angeles, CA, USA (8 Aug 1982).

A new concept in Stirling engine technology is embodied in the "Base Engine" now being developed at Stirling Thermal Motors, Inc. This is a versatile energy conversion unit suitable for many different applications and heat sources. The Base Engine, rated at 40 kw @ 2800 rpm, is a four cylinder, double acting, variable displacement Stirling engine. It incorporates remote-heating technology with a stacked-heat-exchanger configuration and a liquid metal heat pipe connected to a distinctly separate combustor or other heat source. It specifically emphasizes high efficiency over a wide range of operating conditions, long life, low manufacturing cost and low material cost. This paper describes the Base Engine, its design philosophy and approach, its projected performance, and some of its more attractive applications.

43 PARTICLE ACCELERATORS

4301 Design, Development, And Operation

REFER ALSO TO CITATION(S) 10389, 10810

10477 **(CEA-CONF—6765) ALS II: the Saclay proposal for a 2 GeV, CW electron facility.** Aune, B.; Grunberg, C.; Jablonka, M.; Koechlin, F..; Magne, J.; Mosnier, A.; Phung, B.; Netter, F. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Mar 1983. 288p. (CONF-830311—196). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750332.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

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The transformation of the Saclay electron linac facility (ALS) into a 2 GeV, 100 μA CW electron facility is described. Polarized electrons will be available in the whole energy range. In order to reach the required performance, the linac is rebuilt with new klystrons and with the addition of a partial recirculation. The 100% duty cycle is obtained with a stretcher ring.

10478 **(CEA-CONF—6766) Transient beam loading calculations and experiment at the Saclay electron linac.** Aune, B.; Leroy, J.; Mosnier, A. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 3p. (CONF-830311—195). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750331.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

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The transformation of the Saclay electron linac (ALS) into an injector for a 2 GeV stretcher ring is under study. One of the problems associated with this transformation is the use of the existing sections in a new mode of operation. The sections were optimized for low current operation (high attenuation, high internal resistance), they will be used in a high current, short pulse(1μs) mode resulting in a prohibitive transient beam loading energy spectrum broadening. The compensation method used at SLAC, wich consists in delaying the turn-on of some klystrons, has been studied theoritically and an experiment has been performed with a 1μs pulse, at the same beam loading levels as for the future plans.

10479 (INIS-mf—8299, pp 1-7) **Tandem accelerators.** Duerr, W.; Heck, R.; Huck, B.; Ingwersen, H.; Jaeschke, E.; Koessler, V.; Pfahler, R.; Repnow, R.; Schmidt, H.; Schreiner, W. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

After the installation of Ti-acceleration tubes and substantial modifications and additions to the EN tandem accelerator the performance of the machine has stabilized. The voltage behaviour of the tubes obviously improves as conditioning times necessary to run up to 6 MV decrease. A gridded lens has been added at the entrance of the first acceleration tube, and a second foil stripper is now installed in the short dead section between the high-energy tubes. The MP tandem also has been running stably during most of the year. However, beam instabilities originating from the last tube section and wear problems at the low-energy set of Pelletron-chains caused some loss of beam time. During the fall, one set of Pelletron charging chains has to be replaced after 49,000 hours of operation. In the course of the year, the MP and the EN tandem accelerators finished their 100,000th and 150,000th hours of operations, respectively. Preparations for the installation of the 3 MV negative heavy ion injector for the MP are progressing steadily. External beam transport, terminal ion optics, and data acquisition and control systems are to a major extent completed; the integration of the terminal power supplies has started. After the final assembly of the accelerator column structure, first voltage runs can be performed.

10480 (INIS-mf—8299, pp 8-20) **Heidelberger heavy ion postaccelerator.** Brix, P.; Ellinger, P.; Frauenfeld, M.; Griesser, M.; Hahn, W.; Hammel, R.; Hemberger, K.H.; Huck, B.; Ingwersen, H.; Jaeschke, E. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

The Heidelberg heavy ion postaccelerator has been operated during the year 1982 with an overall reliability of over 82% in 28 user beam times totalling 1536 hours beam on target. Highlights were the problem-free operation of the newly installed high beta module increasing the pulse mode voltage to over 22 MV, the development of a high quality 65 MeV alpha beam, as well as the increased availability of the whole system. A power prototype of a βsub(o) = 0.04 three-gap resonator has been built and tested. Four resonators of this type will be a "low beta" module to increase the ion energies for highest masses. This project has been funded by the BMFT for the years 1983-85. Deceleration of highly stripped heavy ions has become routine with the lowest energy used in an experiment being 4.7 MeV for $^{32}S^{15+}$. A high voltage, high efficiency double drift bunching system as well as the digital control system for the 3 MV heavy ion injector have been developed in the postaccelerator group. A microprocessor-based bead-pulling system for cavity design has been built, facilitating the development of rf accelerator resonators.

10481 (INIS-mf—8642, pp 34) **Two years of FJFI microtron operation.** Simane, C.; Vognar, M.; Klisky, V. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10482 **(NIIEFA-P-MO—0537) Computer-graphics system for designing ion-optical systems of charged particle accelerators.** Dolzhenkov, A.N.; Kuznetsov, V.S.; Fidel'skaya, R.P.; Fomichev, A.N. (Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1982. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704563.

The iterative computer system, aimed at automatic control of engineering industry designer's position, is developed to raise the reliability as well as to shorten the period of designing ion-optical systems (IOS) of direct action accelerators. It is realized as a system of programs, providing main functions, which are the following: a calculational model, describing charged particle (electrons or ions) strip beam transport in plane fields, taking into account strengths of Coulomb repulsion and velocity spread of particles in transverse direction; data input and processing; computation of electromagnetic accelerating and focusing fields; data processing and display; computer-designer dialogue. The system makes possible to automatize the choice of the simplest ion-optical system of accelerator and optimize the main parameter of units, to produce all in the possible parameter dependences on the screen or form of plots, and, finally, to formulate and implement a calculational experiment.

10483 **(RL—82-109) Physics of particle acceleration.** Lawson, J.D. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). 1982. 15p. (CONF-820980—7). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704564.

From European Committee of future accelerators - the challenge of ultra-high energies conference; Oxford, UK (27 Sep 1982).

Various methods of particle acceleration are described and compared. A table is given of methods in free space and in a medium using harmonic and non-harmonic accelerating electric fields.

10484 **High field accelerator magnet design (10T, 2T/cm), material and model development.** McInturff, A.D.; Fowler, W.E.; Ishibashi, K.; Kuchnir, M.; Lundy, R.A.; Tollestrup, A.V. (Fermi Nat.'l Accelerator Lab., Batavia, IL 60510). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3393-3395(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Two accelerator magnets have been designed and developed to a manufacturable prototype. Most of the dipole calculations presented will be based on a four shell, five kiloampere/turn, five centimeter aperature magnet, approximately six meters long. Two designs are considered: a dipole bending magnet and the quadrupole focusing magnet. The mechanical and electrical coil parameters are listed.

10485 **Numerical simulation of high power R.F. sources.** Drobot, A.T.; Hanerfeld, H.; Herrmannsfeldt, W.B.; Ko, K.; Seftor, L. (Science Applications, Inc., 1710 Goodridge Dr., McLean, Virginia 22102). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3633-3635(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

In high power microwave tubes the efficient conversion of kinetic electron beam energy to R.F. in a narrow frequency band involves complicated nonlinear electron dynamics and may involve the spontaneous generation of waves at other frequencies. This paper describes the adaptation of an electromagnetic 2D-3V particle-in-cell code MASK to the simulation of such high power R.F. sources. In situations where the R.F. interaction results in the reflection of beam particles, or where there is the excitation of multiple models internal to the microwave device, simulations are a new tool that permit a representation of the physical processes. In addition, they are capable of modeling the transient behavior and not just steady state operation. One of the applications of MASK at SLAC is to aid in the design of a new 150 MW Klystron at 2.85 GHz. This work is currently in progress and the approach to it is outlined. Preliminary results have been obtained for a model two cavity problem and are presented. These results illustrate the complicated dynamics in the nonlinear regime including the presence of reflected particles and harmonic generation. The code has also been run in the linear regime where good agreement has been found with small signal theory.

10486 **Higher order mode studies in accelerator waveguides.** Shoffstaff, D.R.; Gallagher, W.J. (Boeing Aerospace Co., Seattle, WA 98124). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3487-3489(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The motive for the investigation reported here was avoidance of beam excitation and interaction with higher order modes of a waveguide supporting an intended accelerating mode and the lessening of wake field effects by using the largest mean diameter in the waveguide consistent with the operating frequency. Disk-loaded periodic structures are examined and it is revealed through diagrams that the velocity of light line intersects the HEM-11 mode in its dominant phase range, and suggests that operation with between 2 and 3 disks per wavelength will avoid that condition. Doubly periodic structures are also examined. The motive for operating an accelerating structure resonantly is, of course, maximum utilization of RF power; this technique is simpler than using RF feedback. Considering the precision with which the presented equations can measure, the cases of $3\pi/4$ and $4\pi/5$ modes appear to merit further investigation because of the simple design and large aperture, particularly for beam energy recovery systems.

10487 **A layer-wound, 8.7-Tesla superconducting dipole magnet.** Hassenzahl, W.V.; Caspi, S.; Gilbert, W.; Peters, C.; Rechen, J.; Taylor, C. (Lawrence Berkeley Lab., Univ. of Cal., Berkeley, CA 94720). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3396-3398(Aug 1983). (CONF-830311—). Contract AC03-76SF00098.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

A superconducting dipole magnet is discussed in detail and test results are presented. The performance of the dipole magnet demonstrates that it can operate successfully at least at the lower end of fields in He 1 at about 4.3K and in He 11 between 1.8 and 2.16K. A photograph of the magnet is shown and a cross section is given. One of the goals of fabrication was to maintain the first turn of each layer in positive compression against its respective pole island during operation at the highest current. Target values for the precompression were determined for each layer.

10488 **Environmental applications of accelerator technology.** Robinson, D.M. (High Voltage Engineering Corporation, Burlington, Massachusetts). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1430-1432(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Accelerator technology at long last is fulfilling the promise expressed by its enthusiasts thirty years ago of having a role in the reduction of air and water borne pollution and disease. This paper describes with specific examples three types of projects either working or expected to be in commercial operation within a year. All three are energy efficient and likely to be followed by general implementation. The three types of projects are: the disinfestation of liquid sludge from digested municipal sewage by electrons so that the nutrients can safely be used on land and possibly in the ocean; the disinfestation of animal feed to reduce pathogens, specifically the reduction of salmonella in poultry feed; and the more efficient removal of fly ash from the stack discharge of coal-fired power plants, accomplished by superimposing fast rising pulses on the d.c. voltage of conventional electrostatic precipitators.

10489 **Radiological safety for particle accelerators: What part will the states play?.** Hotte, E.D. (Bureau of Radiation Protection, Trenton, New Jersey). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1610-1613(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Since the early 1940s, both federal agencies and state governments have taken an active role in the control of radiation. The Atomic Energy Act of 1946 did not apply to radiation that originated from radiation producing machines and supervision over the public health problems associated with this source of radiation remained within the jurisdiction of individual states. To aid states in the development of radiation regulations the Suggested State Regulations for the Control of Radiation was published by the Council of State Governments in 1962. It is this document which states are turning to for assistance in the promulgation of accelerator-directed regulations.

10490 **Determination of elemental composition in geochemical exploration using a 14-MeV neutron generator.** Evans, L.G.; Jensen, D.H.; Lapides, J.R.; Trombka, J.L. (Computer Science Corp., Silver Spring, MD 20771). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1626-1628(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The use of prompt neutron-gamma techniques is well established in the areas of geochemical exploration and environmental monitoring. However, the problems associated with the determination of absolute composition, as compared to elemental identification, can be substantial. For example, in borehole work, the concentration of water can significantly modify the gamma-ray spectrum of the surrounding material. In marine work, the presence of Cl in the water can seriously mask important gamma-ray lines from elements of environmental interest. In order to study these problems, the authors have been using a 14-MeV pulsed neutron generator and a IGe detector system for field measurements where the amount of water in the material has been varied. In addition, they have been doing systematic laboratory measurements of monoelemental samples in water, to determine the detection sensitivity, linearity, and the gamma-ray lines most useful for analysis. These have included elements of environmental interest, e.g. Cd, Ni, Cr and Zn, in the presence of Cl.

10491 **Determination of elemental composition in geochemical exploration using a 14-MeV neutron generator 11. Theoretical aspects.** Lapides, J.B.; Evans, L.G.; Trombka, J.I. (University of Maryland, College Park, MD 20740). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1629-1631(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A method for determining elemental compositions from neutron-induced gamma-ray spectra has been developed. The method consists of calculating the neutron flux by solving the Boltzmann neutron transport equation and then calculating the gamma-ray flux that escapes from the irradiated material per unit mass fraction of a given element. The procedure was utilized to analyze data obtained from a 14-MeV neutron experiment. Relative abundances for the following major elements were obtained: H, Al, Si, K, Ca, Ti, and Fe. The results agree well with the results of an independent x-ray flourescence determination of material's composition.

4302 Beam Dynamics, Field Calculations, And Ion Optics

REFER ALSO TO CITATION(S) 10820, 11016

10492 **(FERMILAB/TM—1232) Combined function magnet profile design.** Snowdon, S.C. (Fermi National Accelerator Lab., Batavia, IL (USA)). Nov 1983. Contract AC02-76CH03000. 18p. NTIS, PC A02/MF A01. Order Number DE84005163.

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Conformal mapping has been used in the past to generate magnet poleface contours. The present effort extends a notion considered previously in which a plane of symmetry was introduced. One further mapping permits the plane of symmetry to be transformed into a curved surface of bifurcation. A magnetostatic problem set on one side may be continued into the other side thereby providing an exact solution on both sides. An application is made for the Beijing Synchrotron booster magnet.

10493 **(LA—9901-MS) Simulation of betatron-synchrotron coupling.** Colton, E.P. (Los Alamos National Lab., NM (USA)). Nov 1983. Contract W-7405-ENG-36. 9p. NTIS, PC A02/MF A01. Order Number DE84004531.

The results of acceleration simulations for a sample LAMPF II machine are presented. The momentum dispersion is nonzero at the RF cavities. Destructive betatron-synchrotron coupling effects are observed for nu/sub x/ +- nu/sub s/ = 10 and when two RF cavities are used to perform the acceleration. The coupling effects disappear when the number of equally spaced cavities is increased to six while maintaining the same net RF voltage/turn. Further studies are presented that show the effects of turning off one cavity while maintaining the same net RF voltage/turn for both 6- and 15-cavity machines.

10494 **(LBL—16008) Lie algebraic methods for particle tracking calculations.** Douglas, D.R.; Dragt, A.J. (Lawrence Berkeley Lab., CA (USA); Maryland Univ., College Park (USA)). Aug 1983. Contract AC03-76SF00098. 5p. (CONF-830822—49). NTIS, PC A02/MF A01. Order Number DE84004310.

From 12. international conference on high energy accelerators; Batavia, IL, USA (11 Aug 1983).

A study of the nonlinear stability of an accelerator or storage ring lattice typically includes particle tracking simulations. Such simulations trace rays through linear and nonlinear lattice elements by numerically evaluating linear matrix or impulsive nonlinear transformations. Using the mathematical tools of Lie groups and algebras, one may construct a formalism which makes explicit use of Hamilton's equations and which allows the description of groups of linear and nonlinear lattice elements by a single transformation. Such a transformation will be exactly canonical and will describe finite length linear and nonlinear elements through third (octupole) order. It is presently possible to include effects such as fringing fields and potentially possible to extend the formalism to include nonlinearities of higher order, multipole errors, and magnet misalignments. We outline this Lie algebraic formalism and its use in particle tracking calculations. A computer code, MARYLIE, has been constructed on the basis of this formalism. We describe the use of this program for tracking and provide examples of its application. 6 references, 3 figures.

10495 **(SLAC-CN—232) Emittance growth in the collider arcs due to transverse wakefields.** Peterson, J.M.; Wilson, P.B. (Stanford Linear Accelerator Center, CA (USA)). Dec 1983. Contract AC03-76SF00515. 15p. NTIS, PC A02/MF A01. Order Number DE84005035.

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The three main components of the dipole wakefield in the collider arcs are the resistive wall wake due to the finite conductivity of the vacuum chamber wall and the wakes due to discontinuities at the beam position monitors and vacuum chamber bellows. In the first section we estimate the dipole wakefield arising from the resistive wall wake. In the second section results of TBCI calculations of the wakes due to the BPM's and bellows are presented, and compared with the resistive wall calculation. In the final section the total wakefield is used to compute the emittance growth.

10496 **(UCRL—89214-Rev.1) Status of the Lawrence Berkeley Laboratory and the Lawrence Livermore National Laboratory (LLNL) free electron laser (FEL). Revision 1.** Orzechowski, T.J.; Moebus, M.C.; Penko, F.A.; Prosnitz, D.; Rogers, D.; Chavis, C.S.; Halbach, K.; Hopkins, D.B.; Kuenning, R.W.; Paul, A.C. . (Lawrence Berkeley Lab., CA (USA); Lawrence Livermore National Lab., CA (USA)). 17 Nov 1983. Contract W-7405-ENG-48. 26p. (CONF-8306121—4-Rev.1). NTIS, PC A03/MF A01. Order Number DE84004077.

From 4. workshop on free-electron laser devices; Eastsound, WA, USA (27 Jun 1983).

A high-gain FEL experiment using the 10 kA, 4.5 MeV Experimental Test Accelerator (ETA) is described.

10497 **(UCRL—89471-Rev.1) Comparisons of hydrodynamic beam models with kinetic treatments. Revision 1.** Boyd, J.K.; Mark, J.W.; Sharp, W.M.; Yu, S.S. (Lawrence Livermore National Lab., CA (USA)). 21 Dec 1983. Contract W-7405-ENG-48. 14p. (CONF-830911—35-Rev.1). NTIS, PC A02/MF A01. Order Number DE84004191.

From 5. international conference on high power particle beams; San Francisco, CA, USA (12 Sep 1983).

Hydrodynamic models have been derived by Mark and Yu and by others to described energetic self-pinch beams, such as those used in ion-beam fusion. The closure of the Mark-Yu model is obtained with adiabatic assumptions mathematically analogous to those of Chew, Goldberger, and Low for MHD. The other models treated here use an ideal gas closure and a closure by Newcomb based on an expansion in V/sub th//V/sub z/. Features of these hydrodynamic beam models are compared with a kinetic treatment.

10498 **High power microwave generation from a virtual cathode oscillator (Viracator).** Sullivan, D.J. (Mission Research Corp., Albuquerque, NM 87106). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-30: No. 4, 3426-3428(Aug 1983).

High power microwaves, up to Gigawatt levels in the centimeter regime, have been observed in reflex triode, foil and foilless diode systems. Generation efficiencies range from 1% to 12%. The source of the microwaves is an oscillating virtual cathode - the nonlinear state which develops when the electron beam injection current exceeds the space-charge limiting current defined by the beam energy and wave guide geometry. This stable oscillation results in severe longitudinal charge bunching giving rise to large time dependent current variations. The experimental frequency dependence and broadband characteristics are explained by the scaling of the oscillator frequency with $\sqrt{n}$ /SUB b/ /γ, where n /SUB b/ is the beam density and γ its relativistic factor, in conjunction with the Child-Langmuir relation. The optimal design for a narrowband millimeter wave vircator is based on a foilless diode with a strong axial magnetic field. It will be tunable over an order of magnitude in frequency by varying the magnetic field strength.

10499 **High power microwave generation from rotating e-layers in magnetron-type conducting boundary systems.** Striffler, C.D.; Destler, W.W.; Kulkarni, R.; Weiler, R.L. (Electrical Engineering Department and Laboratory for Plasma and Fusion Energy Studies, University of Maryland College Park, Maryland 20742). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-30: No. 4, 3429-3431(Aug 1983).

Studies of the production of microwave and millimeter wave radiation at high harmonics of the relativistic electron cyclotron frequency by the interaction of a rotating E-layer with a multiresonator magnetron boundary system have been conducted. The interaction of a 2 MeV, 1-2 kA, 5 ns cusp injected E layer of radius 6 cm with 12, 20, and 40 slot magnetron type waveguides are studied. Approximately 10% of the injected electron beam power is converted to microwaves at 12 /SUB c/ (10 GHz), 2% at 20 /SUB c/ (17 GHz), and 1% at 40ω /SUB c/ (34 GHz). The authors have theoretically examined this system via analyzing the resonant interaction of a doppler shifted electron beam mode with the modes of the conducting boundary system. The location of these resonant interactions in frequency agrees well with the observed spectrum.

10500 **Transverse particle acceleration techniques using lasers and masers.** Schoen, N.C. (TRW Systems, Bldg. 81 Room 1212, One Space Park, Redondo Beach, CA 90278). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-30: No. 4, 3206-3208(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The concept discussed herein uses an intense traveling electromagnetic wave, produced by a laser or maser source, to accelerate electrons in the Rayleigh region of a focused beam. Although the possibility of non-synchronous acceleration has been considered, very little analysis of potential device configurations has been reported. Computer simulations of the acceleration process indicate practical figure of merit values in the range of 100 MeV/m for achievable electric field strengths with current technology. The development of compact, high energy electron accelerators will provide an essential component for many new technologies. Such as high power free electron lasers, X-ray and VUV sources, and high power millimeter and microwave devices. Considerable effort has been directed toward studies of new concepts for electron acceleration, including inverse free electron lasers, GYRACS, and modified betatrons.

10501 **Test facility for relativistic beam pickups.** Simpson, J.; Konecny, R.; Kramer, S.L.; Suddeth, D. (Argonne Nat.'l Lab., Argonne, IL 60439). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-30: No. 4, 3648-3650(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

The design and operation of an electron linear accelerator to produce electron beams to calibrate beam pickups is described. This test facility for relativistic beam pickups is in operation at the ANL. Calibration of beam signal pickup devices is an important but frequently difficult activity associated with the construction of accelerator systems. This is especially true for pickups used in stochastic cooling systems.

10502 **Filters for stochastic cooling of longitudinal beam emittance.** Kramer, S.L.; Konecny, R.; Simpson, J.; Wright, A.J. (Argonne Nat.'l Lab., Argonne, IL 60439). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* vp(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

This paper describes a type of notch filter and demonstrates the advantages of this filter in providing small notch dispersion and other properties necessary for stochastic cooling systems. A comparative evaluation is made of the advantages between the shorted stub filter and the basic correlator filter. Schematic and phasor diagrams of the basic correlator filter are shown. A description of the BCF system is also given.

10503 **Slot coupled beam signal pickup development at Argonne National Laboratory.** Simpson, J.D.; Konecny, R.; Kramer, S.L.; Suddeth, D. (Argonne Nat.'l Lab., Argonne, IL 60429). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-30: No. 4, 3654-3656(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

This paper examines the characteristics of aperture coupled beam signal pickups and searches for designs applicable to stochastic cooling systems. Slot coupling tests were conducted with the use of Argonne's pickup test facility and numerical models were used and the accuracy and results of these tests are presented. The perturbation theory is used to assist in making an analysis and predicting e-beam activity. Experimental data and laboratory testing methods are given.

4303 Auxiliaries And Components

REFER ALSO TO CITATION(S) 10404, 10501, 10503, 10566, 10609, 10614, 10624, 10808, 10809, 10811, 10816, 10817, 10818, 10819, 10821, 10823

10504 **(BNL—33969) Overview of United States synchrotron radiation facilities.** Watson, R.E. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 13p. (CONF-830910—10). NTIS, PC A02/MF A01. Order Number DE84005095.

From 3. national conference on synchrotron radiation instrumentation; Upton, NY, USA (12 Sep 1983).

There has been considerable activity within the past year involving the creation of new and the improvement of existing capabilities for research with synchrotron light. The purpose of this review is to summarize what has happened within the United States. Being a status report, some of the information necessarily has a date attached to it - the date, in this case, being early September 1983.

10505 **(BNL—34030) Status and future plans for the BNL polarized H^- source.** Sluyters, T.; Alessi, J.; Kponou, A. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 6p. (CONF-831180—16). NTIS, PC A02/MF A01. Order Number DE84004177.

From 3. international symposium on the production and neutralization of negative ions and beams; Upton, NY, USA (14 Nov 1983).

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In 1982, when Haeberli described the design and performance of his 3 μA polarized negative hydrogen source, he predicted that the colinear colliding beam source had the potential to produce H^- beam currents well in excess of 10 μA. The recently constructed AGS source, which is similar to Haeberli's system, has reached peak beam currents in excess of 25 μA, while operating in the

pulsed mode. Standard operation of the AGS machine is 10 μA in beam pulses of 0.5 ms each two seconds. These intense beams have been achieved by cooling the atomic beam from room temperature to 110°K and by increasing the cesium ion current from 2 to 3 mA to the 10 to 15 mA level. Higher polarized beam currents are expected with relatively simple modifications in the design.

10506 **(DOE/CH/03000—T10) Report of ad hoc committee on future computing needs for Fermilab.** (Fermi National Accelerator Lab., Batavia, IL (USA)). Dec 1983. Contract AC02-76CH03000. 103p. NTIS, PC A06/MF A01. Order Number DE84005164.

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The committee was formed at the request of the director of Fermi National Accelerator Laboratory as an ad-hoc group to review its computing needs for the next five to ten years and to make recommendations to him as to the means of satisfying them. The report is broken down into these major headings: estimate of needed capacity; high energy physics tasks and the computing environment; experiment area computers; networking; special data processors; and personal work stations. (GHT)

10507 **(DOE/CH/03000—T11) Fermilab 1982. Annual report of the Fermi National Accelerator Laboratory.** (Fermi National Accelerator Lab., Batavia, IL (USA)). [nd]. Contract AC02-76CH03000. 117p. NTIS, PC A06/MF A01. Order Number DE84005387.

Portions are illegible in microfiche products.

The state of Fermilab is reviewed for 1982, and summaries are given in the following areas: fabricating energy saver superconducting magnets; present knowledge and future directions in particle physics; accomplishments of Fermilab in a decade of operation 1972 to 1982; a photo essay on the energy saver installation work in the Main Ring Tunnel; a listing of 1982 Fermilab experimental, general, and theoretical publications; and a listing of the 1982 workshop and seminar series. (GHT)

10508 **(FERMILAB/TM—1225) Squid based beam current meter.** Kuchnir, M. (Fermi National Accelerator Lab., Batavia, IL (USA)). 25 Nov 1983. Contract AC02-76CH03000. 17p. NTIS, PC A02/MF A01. Order Number DE84004777.

A SQUID based beam current meter has the capability of measuring the current of a beam with as little as 30 x 155 antiprotons (with a signal to noise ratio of 2). If low noise dc current is used to cancel most of the beam or an up-down counter is used to count auto-resets this sensitivity will be available at any time in the acumulation process. This current meter will therefore be a unique diagnostic tool for optimizing the performance of several Tev I components. Besides requiring liquid helium it seems that its only drawback is not to follow with the above sensitivity a sudden beam change larger than 16 μA, something that could be done using a second one in a less sensitive configuration.

10509 **(FERMILAB/TM—1231) Accelerating heavy ions in Fermilab.** Teng, L.C. (Fermi National Accelerator Lab., Batavia, IL (USA)). Nov 1983. Contract AC02-76CH03000. 6p. NTIS, PC A02/MF A01. Order Number DE84005162.

Recently several laboratories initiated discussions on the design and construction of high energy heavy-ion colliders to study the formation and the characteristics of quark/gluon plasma. The beam energies considered are > 30 GeV/nucleon and the costs of the machines considered are all in the hundreds of megabuck class. We consider here a poor-man's scheme of entering into a first phase of such studies.

10510 (INIS-mf—8299, pp 21-28) **Source for polarized heavy ions (PSI) at the MP tandem.** Becker, K.; Blatt, K.; Fick, D.; Gemmeke, H.; Jaensch, H.; Luh, L.; Schneider, U. (Marburg Univ. (Germany, F.R.). Fachbereich Physik); Karban, O. (Birmingham Univ. (UK)); Tanaka, M. (Kobe Junior Coll. (Japan)); Heck, R. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

Status and first results of the new source for polarized lithium and sodium ions at the MP tandem are described. The construction of the source and the 200 keV injection system is nearly completed. The polarization of a Na^+ beam has been detected by beam foil spectroscopy.

10511 (INIS-mf—8299, pp 28-29) **Source for unpolarized sodium ions (SUSI) at the MP tandem.** Duerr, W. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

The atomic beam type source for unpolarized sodium ions at the MP tandem has come to standard operation. By use of a cesium charge-exchange canal up to 500 nA Na^- can be provided for acceleration.

10512 (INIS-mf—8299, pp 29-31) **Further development on sources for polarized alkali ions.** Dreves, W.; Jaensch, H.; Koch, E.; Fick, D. (Marburg Univ. (Germany, F.R.). Fachbereich Physik). 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

The prototype of a source for polarized ^{23}Na has been tested measuring the occupation numbers of the hyperfine sublevels. The concept of producing first a beam of ^{23}Na in a single sublevel by a double resonance technique and then changing the sublevel population with an adiabatic high frequency transition is favourable.

10513 (INIS-mf—8299, pp 63) **Production of isotopic targets and stripper foils.** Huck, B.; Schuehrer, B.; Wirth, H.L. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

General methods to prepare targets and stripper foils are listed here. Also some technical developments to improve the quality of foils.

10514 (INIS-mf—8299, pp 63-64) **Preparation of self-supporting osmium targets.** Wirth, H.L. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

OS targets were prepared by ion sputtering on copper foils and were made self-supporting by etching the copper under an inert atmosphere.

10515 (INIS-mf—8299, pp 64) **Preparation of thick sulfur targets.** Schuehrer, B.; Wirth, H.L. 1983. (In German). NTIS (US Sales Only), PC A03/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

Thick S targets were prepared by melting sulfur in a special mold and packing in a polyethylene bag under vacuum. A second method describes sandwiching sulfur between beryllium plates.

10516 **(LUNFD6/NFFR—3041/1-11(1981)) Production of negative ion beams by charge exchange at the 3UDH Pelletron accelerator in Lund; ion-optical calculations for different geometries.** Skog, G.; Linden, M. (Lund Univ. (Sweden). Fysiska Institutionen). 30 Jun 1981. 27p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704562.

A desription of an electron donor canal constructed at the Pelletron laboratory is given. The effectiveness of different ion optical systems for production of negative ion beams is discussed.

10517 **(ORNL/TM—8952) Shielding considerations for multi-GeV/nucleon heavy ion accelerators: the introduction of a new heavy ion transport code, HIT.** Gabriel, T.A.; Bishop, B.L.; Lillie, R.A. (Oak Ridge National Lab., TN (USA)). Jan 1984. Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE84005307.

A preliminary heavy ion transport code, HIT, has been developed and used to generate basic shielding information for multi-GeV/nucleon heavy ion accelerators. The data presented are the number of neutrons emitted with energies > 100 MeV and the amount of energy carried off by these particles external to a central shielding block composed of iron. These data are compared to similar data generated by the high-energy hadronic transport code, HETC. These data will allow preliminary estimates for shielding of

heavy ion accelerators based on current shielding requirements around proton accelerator facilities. 7 references.

10518 **Energy measurement using a resonator based time-of-flight system.** Pardo, R.C.; Clifft, B.; Johnson, K.W.; Lewis, R.N. (Argonne Nat.'l Lab., Argonne, IL 60439). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 2237-2238(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

A resonant pick-up time-of-flight system has been developed for the precise measurement of beam energy at the Argonne Tandem-Linac Accelerator System (ATLAS). The excellent timing characteristics available with ATLAS beams make it desirable to design the beam transport system to be isochronous. The advantages of the resonant time-of-flight system over other energy analysis systems such as the dispersive magnet system are numerous. The system is non-interceptive and non-destructive and preserves the beam phase space. It is non-dispersive. Path length variations are not introduced into the beam which would reduce the timing resolution. It has a large signal-to-noise ratio when compared to non-resonant beam pick-up techniques. It provides the means to precisely set the linac energy and potentially to control the energy in a feedback loop. Finally, the resonant pick-up time-of-flight system is less expensive than an equivalent magnetic system. It consists of two beam-excited resonators, associated electronics to decode the information, a computer interface to the linac PDP 11/34 control computer, and software to analyze the information and deduce the measured beam energy. This report describes the system and its components and gives a schematic overview.

10519 **High power klystrons for high energy physics research applications.** Demmel, E.; Schmidt, W. (Valvo Rohren- und Halbleiterwerke der Philips GmbH, Stresemannallee 101, D 2000 Hamburg 54). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3432-3434(Aug 1983).

Klystrons have, due to the adaptability of their basic design concept to a large spread of requirements regarding operating frequency, output power level and modes of operation, become the predominant source of microwave power in accelerator and fusion reactor applications. In close cooperation between tube industry and users a spectrum of klystron types covering the frequency range of 200 to 3000 MHz for CW- and pulsed operation has been created to meet these requirements. A selective describtion of the Philips/Valvo activity in this field is given emphasising development issues of CW-types with high unit power and high efficiency.

10520 **The RF system for the Los Alamos free electron laser (FEL).** Friedrichs, C.C.; Hoffert, W.J.; Tallerico, P.J. (AT-5, MS H827 Los Alamos Nat.'l Lab., Los Alamos, NM 87545). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3441-3443(Aug 1983).

The FEL electron linac consists of three buncher cavities: two accelerator cavities and a deflection cavity, each with its own phase-coherent rf source. All sources will be pulsed for 100 μs at a 1-pps rate. The phase and amplitude stability requirements are + or - 1/2°, and + or - 1/2%. There are two subharmonic bunchers, each requiring 5 kW at 108.33 MHz. All remaining cavities operate at 1300 MHz. The fundamental buncher requires 5 kW, whereas each of the accelerating cavities requires at least 3 MW. The deflection cavity requires up to 100 kW, which is coupled from one of the accelerator cavity rf sources. Prominent features of the rf system are the phase and amplitude control circuits and the multimegawatt klystron amplifiers. Three L3707 klystrons were obtained from the AMRAD radar site at White Sands, which was decommissioned in the early 1970s. The tubes originally were designed to produce 10-MW, 10-μs pulses. Each tube has delivered over 3.6-MW, 100-μs pulses in the FEL system.

10521 **The rf-system for SUSE.** Wilhelm, W.; Dorner, E.; Hinderer, G.; Jaeschke, E.; Kienle, P.; Schott, W.; Trinks, U. (Physik-Department der Technischen Universitat Munchen, D-8046 Garching). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3450-3451(Aug 1983).

The RF-System for SuSe consists of two large cavities in opposite valleys. The cavities are driven in the TE 101-mode and have a radial increasing voltage distribution. The maximum accelerating voltage per cavity is 1 MV at a power consumption of about 170 kW. A frequency variability in the range between 59 MHz and 74 MHz is possible in reducing the gap between the capacitively loaded lips, the fine tuning is done with two cylindrical perturbing objects. The cavities were optimized with the aid of the recently developed three dimensional cavity calculation program CAV3D and measurements on several models in the scale 1:5, 1:8 and 1:2.5. A full scale power model is in construction. It will be tested with existing facilities at the Munich tandem laboratory, the large vacuum chamber HEXE and the RF power-generator for the post-accelerator SchweIN. A later application of this test cavity as part of a mass-separator is under consideration.

10522 **Criteria for vacuum breakdown in rf cavities.** Peter, W.; Faehl, R.J.; Kadish, A.; Thode, L.E. (Los Alamos Nat.'l Lab., Advanced Concepts and Plasma Applications Group, Los Alamos, NM 87545). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3454-3456(Aug 1983).

A new high-voltage scaling based on Kilpatrick's criterion is presented that suggests that voltages more than twice the Kilpatrick limit can be obtained with identical initial conditions of vacuum and surface cleanliness. The calculations are based on the experimentally observed decrease in secondary electron emission with increasing ion impact energy above 100 keV. A generalized secondary-emission package has been developed to simulate actual cavity dynamics in conjunction with our 2 1/2-dimensional fully electromagnetic particle-in-cell code CEMIT. The results are discussed with application to the suppression of vacuum breakdown in rf accelerator devices.

10523 **Experiments with very high power rf pulses at SLAC.** Hogg, H.A.; Loew, G.A.; Price, V.G. (Stanford Linear Accelerator Center, Stanford Univ., Stanford, CA 94305). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3457-3459(Aug 1983). Contract AC03-76SF00515.

Experiments in which the powers of two SLAC klystrons were combined and fed into a resonant cavity pulse-compression system (SLED) are described. Pulse powers up to 65 MW into SLED were reached. The corresponding instantaneous peak power out of SLED was 390 MW. After normal initial aging, no persistent rf breakdown problems were encountered. X-radiation at the SLED cavities was generally less than 400 mR/hr after aging. The theoretical relationship between x-radiation intensity and rf electric field strength is discussed.

10524 **A high-q ferrite-tuned cavity.** Earley, L.M.; Carlini, R.; Potter, J.; Theissen, H.A. (Sandia Nat.'l Lab.'s, Albuquerque, NM 87185). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3460-3462(Aug 1983).

Rapid cycling proton synchrotrons, such as the proposed LAMPF II accelerator, require approximately 10 MV per turn rf with 17% tuning range near 50 MHz. The traditional approach to ferrite-tuned cavities uses a ferrite which is longitudinally biased (rf magnetic field parallel to bias field). This method leads to unacceptably high losses in the ferrite. At Los Alamos, we are developing a cavity with transverse bias (to the bias field) making use of the tensor permeability of the ferrite. Initial tests of a small (10-cm-diam) quarter-wave singly re-entrant cavity tuned by several different ferrites indicate that the losses in the ferrite can be made negligible compared with the losses due to the surface resistivity of the copper cavity. Details of the test results will be presented.

10525 An rf electron beam buncher. Vomvoridis, J.L.; Felber, F.S.; Hunter, R.O. Jr.; Spivey, B.; Tajima, T. (Western Research Corp., 8616 Commerce Ave., San Diego, CA 92121). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3466-3468(Aug 1983).

A method is described for producing density modulations on an intense relativistic electron beam by the use of rf fields in a betatron configuration. In concept, a device embodying this method should be capable of producing short (1-10 ns) electron bunches from a long (10-100 ns) beam, and is expected to be relatively compact and to operate efficiently on low power and energy. The method requires that the azimuthal phase velocity of the rf wave equal the electron beam velocity. Depending on phase relative to the rf wave, electrons in the beam gain or lose energy and form bunches by the negative mass effect. The dynamics of the electrons in the combined rf wave and betatron field have been analyzed. An example of an rf electron beam buncher is given.

10526 Field quality aspects of CBA superconducting magnets. Kahn, S.; Engelmann, R.; Fernow, R.; Greene, A.F.; Herrera, J.; Kirk, H.; Skaritka, J.; Wanderer, P.; Willen, E. (Brookhaven Nat.'l Lab., Upton, NY 11973). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3469-3471(Aug 1983).

A series of superconducting dipole magnets for the BNL Colliding Beam Accelerator which were manufactured to have the proper field quality characteristics has been tested. This report presents the analysis of the field harmonics of these magnets.

10527 Magnetic properties of the iron laminations for CBA magnets. Tannenbaum, M.J.; Ghosh, A.K.; Robins, K.E.; Sampson, W.B. (Brookhaven Nat.'l Lab., Upton, NY 11973). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3472-3474(Aug 1983).

The required magnetic properties of the iron for CBA dipoles are for the most part the same as those for conventional accelerators, namely: low coercive force, high permeability at both low and high inductions and high saturation induction. There are two main differences in the CBA application, i) the iron is at 3.8°K, ii) the magnetic field in the iron can go as high as 6 Tesla, which is well above saturation. Measurements of the magnetization curves for CBA iron laminations at 300°K and 4.2°K are presented. The data are analyzed in terms of a simple model in which the variation in saturation induction can be separated from the low field permeability variation. Tolerances on coercive force, permeability and saturation induction are discussed.

10528 Alternate transport techniques for electron induction linacs. Adler, R.J.; Kiuttu, G.F.; Sabol, B. (Mission Research Corp., 1720 Randolph Rd., S.E. Albuquerque, NM 87106). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3198-3200(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Alternate focusing methods will have significant cost and design advantages if they are effective. In this paper the authors outline results and prospects for several of these techniques. The most obvious of the alternate techniques is to use gas cells between accelerating gaps. The pinch force acts to confine the beam. The use of gas cells has also been proposed to damp oscillations due to the beam breakup instability. Experimental results on a particular facet of this problem-extraction from a magnetic region into a gas cell -- are discussed. Results from the first experimental demonstration of the 'image' or 'foil' focusing technique are presented.

10529 Effect of synchrotron radiation in the proposed 4-GeV Argonne microtron. Crosbie, E.A. (Phys. Division, Argonne Nat.'l Lab., 9700 S. Cass Ave., Argonne, IL 60439). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3218-3220(Aug 1983). (CONF-830311—). Contract W-31-109-ENG-38.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Synchrotron radiation in the sector magnets of the 4 GeV microtron designed at the Argonne National Laboratory produces a small but noticeable distortion of the closed orbits of the system and a very significant growth of the horizontal and longitudinal phase space emittances. Because of the small apertures in the three 25 meter linacs, it is important that the expected growth of the beam be calculated as accurately as possible. The dynamical problem has been solved using a computer program which follows the motions of individual electrons in the four dimensional horizontal and longitudinal phase space as they are accelerated in the system. In this paper the authors call attention to the fact that there are 3 long 28 m linac sections separated by sector magnets from 3 dispersion sections where the orbits for different energies are separated. The interaction of the linac rf systems with the synchrotron energy loss in the sector magnets produces different orbit effects in the downstream and upstream linac sector magnets. The average synchrotron radiation energy loss per sector magnet is given.

10530 SORE - a pulse stretcher for the Saskatchewan 300-MeV linac. Bergstrom, J.C.; Caplan, H.S.; Norum, B.E.; Servranckx, R.V. (Accelerator Lab., Univ. of Saskatchewan, Saskatoon, Saskatchewan S7N OWO). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3226-3228(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

A design study has been made of a pulse stretcher to increase the duty factor of the 300 MeV electron accelerator of the Saskatchewan Accelerator Laboratory. The design was constrained by the desire to house the pulse stretcher within the existing accelerator building and to make maximal use of existing beam transport lines. The pulse stretcher ring consists of two 180° bend regions connected by achromatic straight sections. The overall length is 50.49 m and the width is 6.64m. The modes of injection and extraction will be available. In the first mode a shortened linac pulse of 300 ns duration will be injected during a single turn directly into the closed orbit of the pulse stretcher. A second mode of injection/extraction involves use of a longer linac pulse. The basic geometry of the PSR is dictated by the dimensions of the accelerator vault and access room.

10531 The rf power plant of the SPS. Kinderman, H.P.; Herdrich, W.; Sinclair, W. (European Organization for Nuclear Research (CERN), Geneva). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3414-3416(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

This paper describes briefly the main components of a RF power system with the exception of the accelerating cavity. A diagram of a 200 MHz accelerating system is shown. The power for the accelerating cavities is provided by a 500 kW amplifier utilizing 2, 4, 8 and 16 tetrodes or one 500 kW klystron. The terminating load is a 6 m long 6 1/8" stainless steel coaxial line. High power transmission lines with coaxial and waveguide components are discussed.

10532 A plasma wave accelerator SURFATRON 2. Mori, W.; Dawson, J.M.; Joshi, C. (Elec. Eng. Dept., Univ. of Cal., Los Angeles, CA 90024). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3244-3246(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Accelerator schemes of the Plasma Wave Accelerator - Surfatron 11 are examined. Theory and computer simulations are presented which demonstrate that when a magnetic field is inserted perpendicular to the direction of wave propagation, the particles remain in phase with the wave. In principle, particles can, therefore, acquire unlimited amounts of energy. An analysis of the accelerator schemes examined is studied in two parts: the generation of the plasma wave and the dynamics of a single particle in the plasma

wave. To demonstrate that the insertion of a magnetic field does indeed lead to particles, an electromagnetic particle code was conducted. Runs were carried out both with and without the magnetic field and the results were then compared in order to elucidate the differences.

10533 **A high-current racetrack induction accelerator.** Mondelli, A.; Roberson, C.W. (Science Applications Inc., 1710 Goodridge Dr., McLean, Virginia 22102). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3212-3214(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

In this paper, the energy and system scaling laws of the Racetrack Induction Accelerator are determined and its operating principles are discussed. This device is a cyclic accelerator that is capable of multi-kiloamp operation. Long pulse induction linac technology is used to obtain short acceleration times. The accelerator consists of a long-pulse linear induction module and a racetrack beam transport system. For detailed studies of the particle dynamics in a racetrack, a numerical model is required to integrate the fully-relativistic single-particle equations of motion in an externally applied magnetic field. The numerical model is a compromise between the need for a large rotational transform and the need for a reasonable volume within the separatrix.

10534 **Human factors considerations in the monitor systems.** Grisham, D.L.; Lambert, J.E. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **44**: 568-569(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

10535 **Resonance neutron radiography using an electron Linac.** Schrack, R.A.; Behrens, J.W.; Bowman, C.D.; Johnson, R. (National Bureau of Standards, Washington, DC 20234). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1640-1643(May 1983). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Resonance neutron radiography is a method of assaying and measuring the distribution of an isotope in a sample by means of the neutron absorption in the sample. This paper describes a scanning radiography system. A white neutron source is generated by the bombardment of a tungsten photoneutron source by electrons from the NBS Linac. The neutrons are moderated to enhance the production of low-energy neutrons and collimated into a fan-shaped beam. A one-dimensional position-sensitive proportional counter (PSPC) is placed in the beam so that it is evenly illuminated by the neutron beam. The sample to be investigated is then moved through the beam incrementally.

10536 **Capture by highly-charged low-energy ions studies studied with a secondary ion recoil source.** Cocke, C.L.; Dubois, R.; Gray, T.J.; Justiniano, E. (Kansas State University, Manhattan, KS 66506). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1032-1035(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

When a highly-charged fast projectile collides with a neutral atom in a gaseous target it may, in a single collision, remove many electrons from the target while transferring no more than a few eV to the target's center of mass. These low-energy highly-charged (LEHQ) recoils may be extracted for use as a secondary ion beam to study subsequent capture reactions in a second gas target. The authors have developed a LEHQ ion source based on this principle, pumped by 1-2 MeV/amu beams of F, S and Cl. In this paper they discuss the properties of the ion source, and cross sections measured with the source for single and multiple electron capture by Ar /SUP +q/ from Ne for $2 < q < 10$ and Ar energies between 200 and 1000 eV per q.

10537 **Generation of the high-Q ions by the Cryebis method.** Arianer, J. (Inst. of Nuclear Physics, Orsay). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1018-1023(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Very high ionization degrees may be reached by a stepwise ionization process. Cryogenic Electron Beam Ion Sources are linear containment devices which mainly use a magnetofocused electron beam. The authors give herewith the operating principles of this machine and descriptions of some technological elements. The performances of the operating devices are described.

10538 **Production of radioisotopes in the ORNL 86-inch cyclotron.** Terry, J.W. (Oak Ridge National Lab., P. O. Box X, Oak Ridge, Tennessee). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1597-1598(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The radioisotope production facilities and programs of the 86-Inch Cyclotron are reviewed in this presentation. The 86-Inch Cyclotron is designed to accelerate protons to a maximum energy of 22 MeV for internal targets. These protons are used to bombard metals that are electroplated, potted or soldered to water-cooled plates. Additionally, metals and inorganic compounds are bombarded in water-cooled tube targets. High radioisotope production rates are obtained by beam currents as large as 3 mA. Production rates for ^{11}C, ^{57}Co, ^{67}Ga, ^{68}Ge, ^{109}Cd, and other isotopes are presented. The production of ^{11}C for the carboxyl labeling of amino acids in cooperation with Oak Ridge Associated Universities is discussed. The 86-Inch Cyclotron is used for those programs requiring a larger beam current than is available from commercial cyclotrons.

10539 **An overview of experiments at the Indiana University Cyclotron Facility.** Foster, C.C. (Indiana University Cyclotrom Facility, Milo B. Samson Lane, Bloomington, IN 47405). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1240-1245(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The research program of the Indiana University Cyclotron Facility (IUCF) is a product of many factors. Among these factors are the properties of the beams of charged particles available from the cyclotrons, the facilities and personnel available to support experiments, the guidance of the Program Advisory Committee, the decisions of the directors and the ideas and work of the users of the facility. It is the author's purpose, in this brief overview paper, to provide a summary of features and properties of accelerator operation, beams, experimental facilities and the user interaction of interest to a perspective experimental user and a discussion of recent results of measurements made at IUCF.

10540 **Linear electron accelerators for medicine and radiation processing developed in Beijing, China.** Benguang, G. (Beijing Medical Equipment Institute and Qinghua University, Beijing). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1906-1909(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Because of the wide applications in radiotherapy, sterilization, industrial radiography, irradiation processing, etc., the authors started to develop their own machines in this field in 1974. The first linac made in Beijing is a medical one, Model BJ-10. It was completed in 1977 and installed at the Beijing Municipal Tumor Institute and has been used in treatment for 3 years. The parameters of this radiotherapy equipment are determined from the requirements of the treatment on the deep and superficial tumors. In subsystems of this medical linac, the advanced techniques developed since the appearance of the first world's medical linac such as the isocentric gantry system, etc., are adopted as much as possible. The second machine is an industrial linac, Model BF-5 finished manufacturing in 1977 and installed at Beijing Irradiation Experiment Center. The

BF-5 is the successor of the BJ-10 in various techniques. A series of irradiation experiments have been carried out on this machine. Now the authors are developing new linacs to meet the demand for cancer therapy, industrial radiography and other aspects in our country.

10541 **Accel-Decel method of producing high-Q low velocity ions.** Saylor, T.K.; Bayfield, J.E.; Gardner, L.D.; Gulkok, Y.Z.; Sharma, S.D. (University of Pittsburgh, Pittsburgh, PA 15260). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1024-1028(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The double EN tandem Van de Graaff accelerators at the University of Pittsburgh's Nuclear Physics Laboratory have been used in part since 1978, operating in the 3-stage mode, as a source of highly stripped but low velocity ions for experiments of interest to atomic physics. Much of the work has involved investigating the technical details of this new accel-decel technique and gaining practical experience in operating the accelerators in the accel-decel mode. Decelerations to a final energy factor of $\approx$ 50 less than the stripping energy have been achieved for fully stripped oxygen ions and some charge exchange measurements on He published, demonstrating the potential of the accel-decel technique for supplying atomic physics with data from a previously unattainable energy and charge state regime. Practical problems encountered and the technical developments leading to these first prototype experiments will be reviewed. Subsequent developmental work, the present status of the project, and future technical plans at Pittsburgh are summarized. Finally, the future possibilities of the accel-decel technique generally are discussed.

10542 **An ion-beam analysis facility.** Bauman, S.; Hudson, G.M.; Nelson, J.W. (Florida State University, Tallahassee, FL). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1374-1377(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Accelerator-beam analysis methods have received increasing attention and acceptance in recent years. Proton induced X-ray emission (PIXE) analysis has seen extensive development. For the past seven years approximately 10% of the time of the Florida State University Super FN Tandem Van de Graaff has been used with major emphases upon proton elastic scattering analysis (PESA) and PIXE applied to environmental air particulate problems. Plans for the immediate future include completion of a 4MV Van de Graaff laboratory dedicated primarily to quantity output of PIXE analyses while freeing the limited time on the larger Tandem accelerator for PESA and development of new methods. With the addition of such a dedicated accelerator the need for further dedicated computing facilities is evident. With a conservative estimate of operation at 300,000 samples per year, on-line data evaluation is not only desirable but almost essential. A sophisticated, non-linear, least squares computer code developed at our laboratory for PIXE spectrum evaluation has the capability of simultaneously analyzing up to 200 peaks while accounting for interference and absorption in times of 20 seconds to 1 minute. This rapid data evaluation opens the possibility of immediate further processing into even more desired forms than arrays of numbers representing quantitative analyses. Examples of results from varied applications are presented and the usefulness of such a facility is discussed.

10543 **The Indiana University cyclotron facility (IUCF) 1980.** Pollock, R.E. (Indiana University, Department of Physics, Bloomington, IN 47405). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1433-1436(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

This largest isochronous cyclotron operating for nuclear research in the United States recently marked the fifth anniversary of first beam. The properties of the three-stage accelerator complex at IUCF are outlined and some of the operational characteristics are described. Work in progress on understanding and extending the accelerator performance is summarized and some options which are under discussion for future development are introduced.

10544 **The VICKSI accelerator facility and its application to measurement of charge exchange losses.** Beechetti, F.; Chao, C.W.; Martin, B.; Michaelsen, B.; Spellmeyer, B.; Ziegler, K. (Hahn-Meitner Inst. for Kernforschung Berlin Gmblt, Bereich Kern-und Strahlemphysik, Berlin). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1437-1440(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A description of the VICKSI facility is given with emphasis on the special properties which make VICKSI particularly suitable for measurements of charge exchange losses during cyclotron acceleration. Measurements of these losses for carbon-, neon- and argon-ions at different vacuum levels are reported. At the normal operating pressure of VICKSI, namely 3 X 10^{-7} mbar, no losses could be observed for carbon and neon ions, while for argon the transmission to extraction radius was 92%.

10545 **Heavy ion acceleration at the Heidelberg Tandem postaccelerator combination.** Huck, B.; Ingwersen, H.; Jaeschke, E.; Kolb, B.; Repnov, R.; Walcher, Th. (Max-Planck-Institut fur Kernphysik, Heidelberg). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1441-1444(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

At the MPI fur Kernphysik the range of heavy ions available with energy higher than 5 MeV/N has been extended to masses of about A=100 by combining the upgraded 13 MV MP-Tandem with a normal conducting RF-linac consisting of 32 independently phased spiral resonators. A first part of the linac of 10 resonators had already been operated between 1977 and 1979 with maximum effective voltages of 3.3 MV (CW) and 5.5 MV (pulse mode). After completion the extended booster now yields 9.7 MV in CW mode and 18.5 MV in pulse mode (duty factor 0.25). The high flexibility of the booster guaranteed by the independent phasing principle allows operation of the machine in the mass range of A=10 to A=100 with nearly constant acceleration voltage and with almost negligible set up times due to the flexible computer control. The maximum energies obtained so far are for some ions: 164 MeV ^{12}C, 332 MeV ^{32}S, 337 MeV ^{35}Cl, 476 MeV ^{79}Br and 511 MeV ^{127}J. The tandemlike beam quality of the Tandem Booster combination (radial emittance $< 2\pi$ mm mrad, energy resolution $< 10^{-3}$ (with debuncher)) and the available beam pulse width of less than 100 ps are an important contribution to the heavy ion nuclear and atomic physics experiments at MPI since March 1980. The overall availability of the postaccelerator together with the MP Tandem was above 80% of the scheduled user beam time.

10546 **Upgrading the Florida State University tandem.** Fox, J.D.; Chapman, K.R.; Wright, L.H. (Florida State University, Tallahassee, Florida 32306). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1445-1447(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Florida State University has had an active tandem Van de Graaff program in nuclear physics since 1960 when the Model EN tandem was installed. The installation of a Super FN tandem in 1970 upgraded the voltage available to 9.5 MV and enabled the program to move effectively into the area of heavy ion experimentation. Development of a practical inverted sputter source at Florida State enhanced the variety of available ion beams and thereby the vitality of the program. The laboratory is steadily becoming a more regional facility as other laboratories are shut down and replaced with national facilities with great demands on their beam time. Because of heavy schedules, the national laboratories are less effective in the training of students than university laboratories which characteristically undertake longer and more involved experiments.

10547 Heavy ion nuclear tracks - An emerging technology. Spohr, R. (Gesellschaft fur Schwerionenforschung (GSI), Darmstadt). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1448-1451(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

One necessary requirement for a systematic study of nuclear tracks as a structuring tool has been the advent of powerful heavy ion accelerators. Such an instrument is the UNILAC at GSI Darmstadt, where monoisotopic nuclear tracks can be produced with defined range, angle of incidence, and areal dose, using virtually any insulator as target material. In contrast to high dose implantations, track applications are characterized by a very small beam time consumpion. This opens the door for a future large-scale application of such accelerators. Four commercially feasible track applications are described: production of single-hole membranes and their application in medical diagnostics; nuclear track filters with high aspect ratio (length/diameter) of the holes; application of latent nuclear tracks for the fining of magneto-optic materials; and heavy ion lithography for application in microcircuit engineering.

10548 Current accelerators for research and industry. Kneeland, D.R. (Nucletronix, Inc. Gloucester, Massachusetts). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1452-1460(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

In this paper the authors describe four ongoing accelerator projects at Instrument AB Scanditronix in Uppsala, Sweden. These projects are being pursued in addition to the standard product lines of cyclotrons, microtrons, and magnetic spectrographs of Scanditronix and its US affiliate, Nucletronix, Inc., in Gloucester, Massachusetts. The four projects are: the BESSY electron storage ring synchrotron radiation project in Berlin, West Germany; the spallation neutron source project at KFA, Julich, and KFE, in Karlsruhe, West Germany; the NT50 clinical neutron therapy project at the University of Washington in Seattle, Washington; and the RNP16 radionuclide production system at Johns Hopkins University Hospital in Baltimore, Maryland.

10549 A high efficiency bunching system for the TUNL polarized ion source. Wender, S.A. (Physics Department, Duke University, Durham, North Carolina 27706). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1465-1468(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The problem of producing pulsed beams without large beam current losses has been the topic of recent interest particularly in areas where large peak currents are required. In addition, an efficient bunching system will allow the use of pulsed beams when source intensities are limited. The motivation for the development of the authors' high efficiency bunching system arose from their strong interest in neutron physics and the desire to extend their research with experiments requiring polarized neutrons. A common method for the production of polarized neutrons is to bombard a deuterium gas cell with a polarized deuteron beam. The $D(\rightarrow d,n)^3He$ reaction has a large cross section and the outgoing neutron has a polarization of approximately 60 % in the energy range between 6 MeV to 16 Mev. Most experiments which involve the detection of neutrons use time-of-flight techniques to determine the neutron energy. An excellent way of providing time-of-flight information is to use pulsed beams. To be useful for time of flight experiments beam pulses must be on the order of a few nanoseconds wide. In addition there must be sufficient time between beam bursts to allow the reaction neutrons to travel from the target to the detector before the next beam burst arrives at the target. For reactions studied at the authors' laboratory, with their flight paths, this time is on the order of 400 ns.

10550 Radioisotope detection and dating with tandem accelerators. Litherland, A.E.; Beukens, R.P.; Elmore, D.; Gove, H.E.; Kilius, L.R.; Purser, K.H.; Rucklidge, J.C.; Russo, C.J. (University of Toronto, Toronto, Ontario, M58 1A7). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1469-1474(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

During the past three years the Rochester MP tandem accelerator and associated equipment have been used to develop the techniques for the detection of naturally occuring radioisotopes and rare atoms such as the platinum group elements (PGE). Isotope ratios below 10^{-15} (for ^{14}C and ^{36}Cl) and PGE element abundances down to at least 10^{-9} (1 ppb) have been detected. Isotope ratios are also being measured in an effort to develop the techniques for radioisotope dating, element abundance measurements (by isotope dilution), nuclear cross section measurements, cosmic ray exposure ages etc. The apparatus at Rochester is now being further developed to increase the sensitivity and accuracy of the measurements and equipment for Toronto is being built at General Ionex exclusively for isotope and rare element abundance studies in geology, archaeology and nuclear physics.

10551 Radioisotope dating using an EN-tandem accelerator. Suter, M.; Balzer, R.; Beer, J.; Bonani, G.; Oeschger, H.; Stauffer, B.; Wolfli, W. (Laboratorium fur Kernphysik, Eidg. Technische Hochschule 8093 Zurich). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1475-1477(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

In the last few years several groups have demonstrated that rare isotopes present in concentrations of 10^{-10}-10^{-16} can be detected by conventional existing Tandem Van-de-Graaff accelerators and cyclotron facilities. The new technique has a wide range of applications, especially in the field of radioisotope dating, because samples weighing not more than a few mg are required for a proper analysis. In order to apply this new technique for high precision measurements, improvements in the existing facilities are necessary or new specifically designed machines have to be built. In several laboratories such upgrading programs have been started and new machines are under construction. In this paper the authors describe the modifications of an existing EN-Tandem facility, permitting the detection of radioisotopes such as ^{10}Be, ^{14}C, ^{26}Al and ^{36}Cl in small samples. A new sputter source designed primarily for these experiments is under development and a new isotope identification and detection system is installed on a separate beam line. In this paper tests performed with the new components are discussed.

10552 Improvement in an accelerator based mass spectrometer for measuring ^{10}Be. Thomas, J.; Mangini, A.; Parker, P. (Yale University, New Haven, Connecticut 06511). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1478-1480(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Yale Tandem isotope analysis system has been improved. The previous work done at Yale used the existing accelerator facilities without any modifications. More recently, the authors have developed some specialized apparatus and techniques which allow us to measure ^{10}Be, in natural samples, with greater sensitivity and improved reliability. For example, they have developed a new inverted cone configuration for our cesium sputter source that utilizes 1/2 mg samples of BeO. They have also developed a ΔE-E telescope which employs a gas proportional ΔE detector, which enhances the ^{10}B - ^{10}Be discrimination. They have also simplified the procedures for extraction of BeO from a sample; the new procedure requires only 2 mg of ^{9}BeO carrier. Overall, the authors can detect a reservoir of ^{10}Be containing only 10^8 atoms. They have also been studying the feasibility of transferring this program of ^{10}Be measurements to a smaller accelerator. They make some specific suggestions as to how this can be done.

10553 The NBS 14 MeV absolute neutron beam facility. Duvall, K.C.; Wasson, O.A. (National Bureau of Standards, Washington, DC 20234). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1488-1489(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A 14 MeV absolute neutron beam has been established at the NBS 3 MV positive-ion Van de Graaff Accelerator Laboratory. The T(d,n)α reaction is used for the production of the 14.1 MeV neutron flux with a source strength of 10^8 n/sec. The neutron flux is absolutely determined by the measurement of the associated alpha particle rate in a silicon surface barrier detector positioned at 84 degrees with respect to the beam axis. The facility may be used to measure the absolute response of active neutron monitoring devices with high accuracy. The neutron background contributions may be eliminated in the calibration measurements by utilizing the coincidence between the device and the solid state alpha detector. This method allows a neutron flux in a cone of 2 degree half angle to be placed at 90 degrees with respect to the beam axis.

10554 Low velocity acceleration with the RFQ linac structure. Junior, P.; Deitinghoff, H.; Halfmann, K.D.; Klein, H.; Muller, J.; Muller, R.W.; Schempp, A. (Univ. Frankfurt/Main, D-6000 Frankfurt/Main). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1504-1507(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

RFQ linacs are well matched to low particle velocities (β about 1/1000 corresponding to 238 keV U^+ or 1 keV H^+). Designs of both a proton and a heavy ion linac are presented. Especially for acceleration of lighter ions the ion source as well as the target can be advantageously installed nearly on ground potential. Axial and radial acceptances as functions of linac parameters are discussed.

10555 The health physics program at the National Bureau of Standards LINAC. Hobbs, T.G. (National Bureau of Standards, Washington, DC). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1600-1602(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A three-person Accelerator Health Physics team provides continuous radiation safety service for the National Bureau of Standards 150-MeV linear electron accelerator (Linac), which operates on a five days per week, 24 hours per day schedule, with one day per month downtime scheduled for maintenance. This team also serves the synchrotron ultraviolet light radiation facility (SURF), two Van de Graaffs, some other electrostatic accelerators, and several high-energy x-ray generators. Although the Linac is not licensed by a safety-regulating agency, as is the NBS Research Reactor, Health Physics makes no distinction between the two sources in providing coverage. Various regulations do impact on operations, e.g., the NRC dose totals and effluent releases and the OSHA requirements. Film, thermoluminescent dosimeters (TLD), and direct-reading pocket dosimeters are used for personnel dosimetry. The usual array of portable and fixed radiation survey meters and activation devices and some of the high-energy multiparticle activation techniques are used for area monitoring. Environmental surveillance is performed with TLD's, tissue-equivalent ion chamber, and a grass and soil assay program. Integrated Health Physics programs for all the NBS radiation facilities do instrument calibrations, training for Health Physics and operating staffs, administrative control of radioactive materials, waste management, and data compilations.

10556 Radiation safety at a neutron generator. Rank, E.X. (Naval Research Laboratory, Washington, DC 20375). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1603-1605(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Naval Research Laboratory has a number of accelerators capable of producing neutrons with their attendant neutron radiation safety problems. These include a 66 MeV Linac, a 55 MeV Cyclotron, a 5 MeV Van de Graaff and a Kaman Neutron generator. Since the radiation safety problems which occur at a neutron generator are common to all these machines we will discuss all of them as a class of machines called neutron producing accelerators. These machines at NRL produce neutron fluxes up to 10^{14} neutrons per second (Linac) with energies up to 40 MeV (Cyclotron). Neutron producing accelerators present special radiation safety problems which can roughly be divided into two categories: Measurement and control of the neutron field and measurement and control of the activation products left after the machine is turned off. This paper outlines some of the problems encountered and some of the steps taken to "solve" these problems at NRL.

10557 Examination of product throughput obtained from high power Bremsstrahlung sources. Farrell, J.P. (Radiation Dynamics, Inc., Melville, New York 11747). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1786-1793(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Bremsstrahlung from high power electron accelerators provides an intense source of penetrating radiation for industrial processing. Applications include the sterilization of disposable medical products and radiation preservation of food. This paper reports on theoretical and experimental investigation of the Bremsstrahlung radiation processing throughput that can be achieved using 3 to 6 MeV electron accelerators with up to 300 kilowatts of electron beam power. The theoretical calculation integrates experimentally determined angular distributions of unscanned electron beams to calculate the fields produced by scanned beams. Absorbed dose distributions for continuous processes are calculated and the maximum-to-minimum dose ratio and product throughput are obtained as a function of package dimensions. Data are presented for multipass conveyors that move the product on linear or circular trajectories through the radiation field. Results of experimental measuring using thin film dosimeters to check the results of the calculation are also discussed.

10558 NBS SURF 11: A small versatile synchrotron light source. Rakowsky, G. (National Bureau of Standards, Washington, DC 20234). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1519-1521(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Synchrotron radiation sources do not have to be large multimegadollar installations. SURF II is based on a compact electron storage ring with a radius of only 0.84 m, an operating energy of 250 MeV, and useful light output down to 5 nm. Small beam size, high brightness and wide-angle light ports give SURF II unique capabilities. Presently five beamlines are instrumented and operational, supporting experiments in atomic and molecular physics, surface science and materials studies, as well as providing optical calibration services. Nearing completion is a large facility for calibrating optical instruments, especially those intended for space flight. The capability of determining the absolute light flux emitted by SURF II has recently been improved and is now operational. The technique employs ultralinear silicon photodiodes to detect and count individual electrons in the stored beam. Other user conveniences include close access to the machine, flexible scheduling and close interaction with the operations staff. The machine's simplicity contributes to reliability and a high ratio of beamtime to downtime.

10559 An electron-optical system for the efficient operation of a constant energy $\pi/4$ electrostatic parallel plate electron analyzer. Toten, A.; Bhalla, R.P.; Breyer, F.; Hamdi, A.; McDaniel, F.D. (North Texas State University, Denton, Texas 76203). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1567-1569(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Two Einzel lenses are used in conjunction with an intermediately located deceleration grid arrangement to efficiently manipu-

late the shape and energy of an electron beam prior to the analyzer entrance slit. This system decelerates all electrons to be analyzed to a selectable transmission energy that is held constant for a given spectrum. The Einzel lens parameters are varied dynamically with the deceleration grid potential so that the desired electron energy band is focused and passed to the entrance slit. The cylindrical symmetry of the first lens enhances the intensity. The efficiency of detection is further aided by the planar symmetry of the second lens. The design of this variable band, selectable band width electron filter is discussed. Operational parameters and sample spectra are presented.

10560 **A coupled triplet configuration of the Oxford microprobe.** Watt, F.; Blower, G.D.; Grime, G.W.; Takacs, J. (Oxford University, Keble Road, Oxford). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1413-1416(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Beam optics calculations have been carried out on three probe forming quadrupole configurations. The Oxford coupled triplet configuration (CDC) is shown to have relatively high demagnification in both focussing planes, although at the expense of high chromatic and spherical aberration coefficients. A 2000 lines/inch copper electron microscope mesh has been scanned by a 4 MeV proton beam focussed to a spot using the CDC configuration. Deconvolution of the beam profile from proton induced X-ray profiles of the mesh has yielded dimensions of around 1μm in both planes.

4304 Storage Rings

REFER ALSO TO CITATION(S) 10422, 10558

10561 **(CAPE—2927) SLAC SPEAR beam line modules 1 through 18 (Engineering Materials).** (Stanford Linear Accelerator Center, CA (USA)). 13 Dec 1983. Contract AC03-76SF00515. TIC, PO Bx 62, Oak Ridge, TN 37831.

Portions are illegible in microfiche products8 35-mm aperture cards.

The listed assembly drawings provide the overall outline and assembly information in general for the SLAC SPEAR electron-positron storage ring's main beam line equipment modules. The various devices are mounted on reinforced concrete girders which act as moving platforms and support girders for the storage ring. These modules were constructed in a separate building and then moved to the proper location in the storage ring. No detail drawings are included in this group.

10562 **(LAL—83-13) Techniques for longitudinal polarisation in electron storage rings.** Buon, J. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire). May 1983. 15p. (CONF-830231—8). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750308.

From Europhysics study conference on electroweak effects at high energies; Erice, Italy (1 Feb 1983).

Progress in studies for designing polarised beams in very high energy electron storage rings is reviewed. Main emphasis is concentrated on devices delivering special spin manipulations for obtaining highly and longitudinally polarised electrons of both helicities at interaction points in collision mode with opposite beams of positrons (or protons). These devices are: 90° spin rotators, 180° spin rotators (Siberian snakes), asymmetric wigglers, spin flippers and finally spin matching procedures for suppressing beam-beam depolarisation. Recent theoretical progress allows now experimental developments at future high energy electron rings like HERA, TRISTAN and LEP.

10563 **(LAL-RT—83-07) Second order effects of a sextupolar field on betatron oscillations in a storage ring.** Jejcic, A. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire). Mar 1983. 2p. (CONF-830311—194). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750307.

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

Calculations concerning the betatron oscillations in a storage ring lattice comprising a lumped element sextupole field are presented. The method used is based on the second order approximation of the averaging method. The existence of singular points inside the region of the phase space defined by the separatrix is assumed. Formula are given permitting the calculations of the size of the corresponding intersecting invariant curves and a simple expression is deduced for the betatron tune shift. Numerical application is made, the results are compared to those obtained by a tracking program. A good agreement between them is noticed.

10564 **Breakdown and resonance behavior of the SRS waveguide.** Dykes, D.M.; Jackson, A.; Taylor, B. (Science & Eng. Research Council, Daresbury Lab., Warrington WA4 4AD). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3481-3483(Aug 1983). (CONF-830311—).

From Particle accelerator conference; Santa Fe, NM, USA (21 Mar 1983).

During the early running of the SRS storage ring the energy was limited to 1.8 GeV because of unexpected electrical breakdown in the waveguide-cavity system. This occurred at roughly 120 kW, half the rated power of the klystron. High power tests showed an unacceptably large amount of third harmonic generated by the klystron, which was found to be produced by a faulty component in the feeder system. Low power investigations indicated that the waveguide-cavity system had a rich resonance spectrum, which could be tuned by changes to any of the movable system components. With the system as initially set, one particular mode could be readily tuned to the third harmonic frequency. The faulty component was replaced and the waveguide system rearranged. With these changes and with the system adjusted to avoid any third harmonic modes, the rf system was immediately able to operate at full power. The SRS has since operated consistently at its design energy of 2 GeV with no rf trips from these effects. The low power tests also revealed that the magic tees only provide good isolation at the 500 MHz operating frequency; the waveguide system thus forms a feedback loop at higher order mode frequencies with the circulating beam and the cavities. This may explain some of the beam instabilities observed in the SRS. This paper delineates the waveguide layout, the parameters of the high and low power tests, and the test results which led to the foregoing conclusions.

10565 **SURF-II upgrade features magnet and rf system enhancements.** Rakowsky, G. (National Bureau of Standards, Washington, DC 20234). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3444-3446(Aug 1983).

The NBS electron storage ring, SURF-II, has been upgraded with a number of major enhancements. The magnet system capability has been increased from 240 to 300 MeV, although actual operation is presently RF limited to 280 MeV. The storage ring magnet has been carefully mapped, resulting in more precise determination of beam energy and better radiometric data. The RF system has been augmented by an auxiliary second harmonic system, terminating in a novel, dual purpose cavity. This structure performs the function of the bump coil during injection, while during acceleration and stored beam operation it functions as a second harmonic cavity. In the latter mode it can either be tuned passively to suppress longitudinal bunch oscillations, or it can be driven actively to modify the longitudinal bunch shape. With proper amplitude and phasing relative to the main RF cavity, bunch lengthening can be achieved, resulting in improved beam lifetime without an increase in vertical size.

10566 **Damping ring rf system for SLAC.** Allen, M.A.; Schwarz, H.D.; Wilson, P.B. (Stanford Linear Accelerator Center, Stanford Univ., Stanford, CA 94305). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3447-3449(Aug 1983). Contract AC03-76SF00515.

The linear collider project at SLAC contains two damping rings to reduce the emittance of short electron or positron bunches which contain 5 x 10^{10} particles per bunch. Two of these bunches are stored at a time and then extracted for acceleration in the col-

lider. The rf system is subject to strong transients in beam loading. A computer model is used to optimize capture while minimizing rf power. The introduction of phase jump in the rf drive at injection time together with offsets in the tuning loops of the rf cavities when no beam is stored allows optimum performance under heavy beam load conditions. The rf system (800 kV at 714 MHZ) for the electron damping ring has been built, tested and installed, and is being tested with beam.

10567 **Development of a high power rf system for the Daresbury SRS.** Dykes, D.M.; Taylor, B. (Science and Eng. Research Council, Daresbury Lab., Daresbury, Warrington WA4 4AD). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-30**: No. 4, 3475-3477(Aug 1983).

The r.f. system for the high current electron storage ring is illustrated in its present state of development, attention being drawn to modifications and counter measures added to the original design. Some of the characteristics, problems and achievements of the system are discussed. Practical techniques for the diagnosis of system problems are described.

44 INSTRUMENTATION

4401 Radiation Instrumentation

REFER ALSO TO CITATION(S) 9842, 10490, 10491, 10535, 10626, 10981, 11158

10568 **(AERE-M—3291) Isotope tracer measurement system incorporating the HP85 computer.** Phillips, G.; Hogg, C.; Seymour, F.D. (UKAEA Atomic Energy Research Establishment, Harwell. Instrumentation and Applied Physics Div.). Jan 1983. 7p. Available from HMSO, London, price Pound2.00.

A Harwell 6000 series instrument used for radioactive tracer measurements is described. The equipment includes a multidetector, logging, and analysis facilities. The instrument, though designed to work directly with a HP 85 computer, can operate independently if required.

10569 **(BNL—34025) Energy calibration of a multilayer photon detector.** Johnson, R.A. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 14p. (CONF-8304126—2). NTIS, PC A02/MF A01. Order Number DE84005314.

From Calorimeter calibration workshop; Batavia, IL, USA (29 Apr 1983).

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The job of energy calibration was broken into three parts: gain normalization of all equivalent elements; determination of the functions for conversion of pulse height to energy; and gain stabilization. It is found that calorimeter experiments are no better than their calibration systems - calibration errors will be the major source of error at high energies. Redundance is found to be necessary - the system should be designed such that every element could be replaced during the life of the experiment. It is found to be important to have enough data taken during calibration runs and during the experiment to be able to sort out where the calibration problems were after the experiment is over. Each layer was normalized independently with electrons, and then the pulse height to energy conversion was determined with photons. The primary method of gain stabilization used the light flasher system. (LEW)

10570 **(CEA-CONF—6640) DIOGENE: a small-scale pictorial drift chamber at Saturne.** Poitou, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Feb 1983. 12p. (CONF-830223—8). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704164.

From Wire chamber conference; Vienna, Austria (15 Feb 1983).

A pictorial drift chamber, called DIOGENE, has been installed at Saturne in order to study central collisions of high energy heavy ions. It has been adapted from the JADE internal detector, with two major differences to be taken into account. First, the center-of-mass of these collisions is not identical to the laboratory reference frame. Second, the energy loss and the momentum ranges of the particles to be detected are different from the ones in JADE. It was also tried to keep the cost as small as possible, hence the choice of minimum size and minimum number of sensitive wires. Moreover the wire planes are shifted from the beam axis: this trick helps very much to quickly reject the bad tracks caused by the ambiguity of measuring drift distances (positive or negative) through times (always positive).

10571 **(CEA-CONF—6644) Pattern recognition program for the pictorial drift chamber DIOGENE.** Poitou, M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Feb 1983. 12p. (CONF-830223—9). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704165.

From Wire chamber conference; Vienna, Austria (15 Feb 1983).

The rather small size of the Diogene pictorial drift chamber has several unfavourable consequences: not more than 16-18 points to define even the best isolated tracks; high track density and hence missed points due to double hit resolution; strongly bent trajectories and thus many track crossings. In spite of these difficulties, the events can be analyzed. The program takes advantage of the fact that the vertex position is known. Two different methods are used: the first one selects out rather quickly most of the tracks by a simple strategy; the remaining tracks are then searched by a more global but much more time consuming method.

10572 **(CEA-R—5224) Automatic treatment of a complex γ spectrum, results of the P.T.I. R12 intercomparison.** Morel, J.; Chauvenet, B.; Dalmazzone, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 37p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750259.

Portions are illegible in microfiche products.

In γ spectrometry, laboratories are equipped with analysis systems enabling one or several codes for automatic γ data processing to be used. In the framework of the national coordination of ionising radiation metrology, the P.T.I. R12 action (Interlaboratory Test Programme) is a test of processing methods for complex γ spectra from the spectrometer calibration to the identification of radionuclides according to a data file and the determination of activities. Several laboratories have participated in this intercomparison, this document reports the main results.

10573 (CONF-821215—, pp 573-576) **Capabilities of the Los Alamos National Laboratory's environmental emergency response vehicle.** Van Etten, D.; Talley, D.; Buhl, T.; Hansen, W. (Los Alamos National Lab., NM). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

A 4-wheel drive van has been outfitted for rapid and varied monitoring response to radiological emergencies. The vehicle's capabilities include 4-wheel drive plus auxiliary winch for access to rugged off-road terrain. On-board equipment is powered by a 6.5 kilowatt ac generator or by external ac power where available. Monitoring systems include two multichannel analyzers; one, a 2 K portable analyzer with intrinsic germanium detector, the second, a microprocessor based 4 K analyzer with a swivel head intrinsic germanium detector. Rapid gamma searches are performed with a delta rate meter system using a chart recorder with two 4" x 4" x 16" NaI detectors. Other equipment includes portable high volume air samplers and a portable phoswich, as well as the usual portable radiation survey instruments. The construction is modular so that equipment racks, detectors, ac generator and other major structures can be removed or replaced in a matter of minutes. 2 figures.

10574 **(CONF-830874—32) Sensitive collinear laser spectroscopy on fast atom and ion beams.** Carter, H.K.; Juncar, P.; Bounds, J.A.; Bingham, C.R.; Pegg, D.J.; Fairbank, W. Jr. (Oak Ridge Associated Universities, Inc., TN (USA); Tennessee Univ., Knoxville (USA). Dept. of Physics; Colorado State Univ., Fort Collins (USA); Vanderbilt Univ., Nashville, TN (USA). Dept. of Physics). 1983. Contract AC05-76OR00033;AS05-76ER04936;AS05-76ER05034. 6p. NTIS, PC A02/MF A01. Order Number DE84003403.

From 27. annual international technical symposium on high speed photography, videography and photonics; San Diego, CA, USA (21 Aug 1983).

A fiber optic light collector has been constructed in order to efficiently guide photons from a long narrow source onto the face of a photonmultiplier. We present here a brief review of the technique of collinear laser-fast atom beams and describe the performance of this new collector in such a collinear system.

10575 **(CONF-8310234—1) Dispersed beam coincidence spectrometers.** Geesaman, D.F.; Zeidman, B. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 16p. NTIS, PC A02/MF A01. Order Number DE84003671.

From Magnetic spectrometer workshop; Williamsburg, VA, USA (9 Oct 1983).

Work is summarized that has been done on spectrometer design for GeV electron spectrometers, including work both on high resolution and medium resolution spectrometers with relatively large solid angle and momentum acceptance. The first study is of a high resolution coincidence pair with one of the spectrometers designed to provide the necessary target position. This type of system is the type needed to study (e,e'p) reactions to discrete three body final states with resolution of 100 keV. A complementary system to the first is required for experiments where solid angle is more important than resolution, as in (e,e'p) reactions on ^{4}He or ^{3}He, or pion production experiments on light nuclei. Emphasis is on preserving information on the position of the beam on target. (LEW)

10576 **(ECN—128) Final report on the REAL-80 exercise.** Zijp, W.L.; Nolthenius, H.J.; Verhaag, G.C.H.M.; Zsolnay, E.M.; Szondi, E.J.; Cullen, D.E.; Ertek, C. (Stichting Energieonderzoek Centrum Nederland, Petten). Feb 1983. 183p. (INDC(NED)—7; BME-TR-RES—6/82). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83704561.

The aim of the interlaboratory REAL-80 exercise, organized by the IAEA, was to determine the state-of-the-art in 1981 of the capabilities of laboratories to adjust neutron spectrum information on the basis of a set of experimental activation rates, and to predict the number of displacements in steel, together with its uncertainty. The input information distributed on magnetic tapes to participating laboratories comprised values, variances and covariances for a set of input fluence rates, for a set of activation and damage cross-section data, and for a set of experimentally measured reaction rates. Two spectra are dealt with: the thermal ORR spectrum with 19 reaction rates, and the fast YAYOI spectrum with 12 reaction rates. The spectral shapes of the solution spectra showed considerable spread, both for the ORR and the YAYOI spectrum. When the series of predicted activation rates in nickel and the predicted displacement rates in steel derived for all solutions is considered, one cannot observe significant differences due to the adjustment algorithm used. The largest deviations seem to be due to effects related to group structure and/or changes in the input data. The predicted activation rate in nickel is lower than the measured value.

10577 **(EFI—493(36)-81) Magnetic spectrometer of the "Deuteron" device based on multiwire proportional chambers.** Ajvazyan, R.B.; Alanakyan, K.V.; Amaryan, M.D. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 17p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704166.

Description and test results of a spectrometer for the "Deuteron" facility are presented. The spectrometer is designed for investigations into the γ-induced photoproduction of charged particles on nuclei in the angular range of 20 to 120 deg, at pulses of detected particles up to 1.5 GeV/c. The secondary charged particles, produced in a target following γ-quanta irradiation, are deflected in magnetic field and registered by a system, consisting of two scintillation counters, three flat gas counters and two multi-filament proportional chambers. The particle trajectory is determined by measuring a coordinate at three points. The proportional chambers and gas counters are included in the selection and registration system with the output pulse widths of 60 ns, which ensured their high efficiency (about 0.98). The spectrometer has been tested and calibrated by means of registering the particles produced by irradiation of Alsup(27) with bremsstrahlung γ-quanta of Esub(max)=4.5 GeV and at registration angles of 50 and 90 deg.

10578 **(EFI—516(3)-82) X-ray transition radiation detection using the thin converters.** Margaryan, A.T. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704167.

A new method for the detection of X-ray transition radiation (XTR) based on using thin converters is proposed. The physical processes are simulated by means of the Monte Carlo method. The result of the calculations for considered variants of XTR detectors are given.

10579 **(EFI—519(6)-82) Possibility of improving the multilayered detector energy resolution.** Chilingaryan, A.A.; Ter-Antonyan, S.V. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704580.

A new method of the calorimetric information processing is described using as example the problem of μ-meson energy determination by means of a spark calorimeter. A comparison is carried out with the existing methods of energy estimate.

10580 **(EGG—10282-2026) 1984 State of the art of the technology of mercuric iodide x-ray and gamma radiation detectors.** Schieber, M.; Schnepple, W. (EG and G, Inc., Goleta, CA (USA). Energy Measurements Group). Oct 1983. Contract AC08-83NV10282. 27p. NTIS, PC A03/MF A01. Order Number DE84005462.

The present state of the art of mercuric iodide technology is reviewed. Recent progress is reported in the use of HgI_2 in high energy resolution x-ray and gamma ray spectrometers which operate at room temperature. Purification of starting materials, methods of crystal growth, detector fabrication, and characterization methods used for HgI_2 are described, and some applications of HgI_2 detectors to various device systems are given.

10581 (INIS-mf—8642, pp 35) **Neutron radiography analyzer - attempt at combining imaging and instrumental analyses.** Hrdlicka, Z. (Ustav Jaderneho Vyzkumu CSKAE, Rez (Czechoslovakia)). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10582 **(ISN—82-38) Multidetector system for the search and investigation of high spin, high energy isomers produced in heavy ion induced nuclear reactions.** Bialkowski, J.; Jastrzebski, J.; Klepacki, P. (Grenoble-1 Univ., 38 (France). Inst. des Sciences Nucleaires). 1982. 38p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704169.

A multidetector system consisting of 14 NaI(Tl) detectors working in multifold coincidences with a Ge(Li) detector is presented. Its associated electronics and the hardware data acquisition system is described. Timing limitations of the method applied to the search for short half-life isomeric states are discussed. Some applications and results are briefly mentioned.

10583 (ITEF—39(1982)) Calibration of the IHEP neutrino detector spark calorimeter in the electron beam at the energy of 1-8 GeV. Zajtsev, A.A.; Zel'dovich, S.A.; Kalganov, N.V. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1982. 19p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704171.

A spark calorimeter used for measuring the energy of electrons and gamma quanta in reactions of high-energy electron and muon neutrino interactions with a matter is described. The calorimeter consists of 44 optical spark chambers between which aluminium filters are placed. The calorimeter was calibrated in the electron beam at the energy of 1-8 GeV. In the course of the calibration measurements the dependence of spark number on the electron energy and calorimeter structure has been studied. The results obtained shows that the calorimeter energy resolution does not practically depend on energy and amounts of an order of 25%.

10584 (ITEF—88(1982)) Method of application of spark chambers with magnetostriction data output in arbitrary magnetic fields. Bobchenko, B.M.; Zhurkin, V.V.; Kanavets, V.P.; Kropachev, G.N.; Martynov, V.I.; Morozov, B.V.; Nesterov, V.M. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1982. 12p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704172.

To extract data on charged particle interaction in highly inhomogeneous magnetic fields a new method of wire spark chamber application is suggested. It implies transmission of spark current to the magnetostrictive transducer located out of the magnetic field influence using bifilar that compensates output inductance. The bifilar cable length being 2 m, magnetostrictive signal was not practically attenuated, stray pick-up level was not more than 2%. Description of chamber design and details of its production practice are presented. The above data output method makes it possible to apply standard electronics and to increase spatial resolution for sparks chosing different wire spacing in the magnetostrictive spark chamber unit.

10585 (ITEF—145(1982)) Investigating parameters of the "Elena-F" and "Electron" detectors for space research using the separated beam no. 530 of the ITEF accelerator. Gal'per, A.M.; Grachev, V.M.; Dmitrenko, V.V.; Polukhina, N.G.; Ulin, S.E.; Kostromin, V.N.; Smirnov, G.N.; Trebukhovskij, V.Yu. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki). 1982. 18p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704170.

Calibration at a proton accelerator with a separated beam having 0.4-1.4 GeV/c pulse of Elena-F and Electron telescopes consisting of a Cherenkov gas detector and scintillation counters interlayed with lead absorbers is described. Different combinations of counters and lead absorbers will permit to simultaneously record electrons and protons in energy ranges of 50-600 MeV. Two separate scintillation counters included in coincidence circuit were used as a monitor. One of them is installed before the device, the second is in the second focus and each of them overlaps the beam completely. It is shown that dependence of proton recording efficiency on pulse is determined, mainly, with the Cherenkov radiation. Dependences of proton, pion and deuteron recording efficiency with the Cherenkov detector are presented. Efficiency of subthreshold proton recording in the pulse range of 0.4-0.9 GeV/c, to which the devices investigated are the most sensitive, constituted 10%. The Cherenkov additional solid detector, which will permit to decrease sensitivity to subthreshold protons, is suggested to include in a telescope.

10586 (JINR—1-82-679) Some methodical problems of processing data from one meter propane bubble chamber. Bajramov, A.A.; Valkar, Sh.; Dvornik, A.M.; Mailov, A.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1982. 7p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704173.

Methodical investigations connected with hadron-nuclear interactions were carried out by using PK-200 one-meter propane bubble chamber. It was filled with propane-freon mixture C_3H_8 + CF_3Br. A simple parametrization of magnetic field of IK-3-4 electromagnet in chamber's effective volume has been found. Some values of percent weight content of components of propane-freon mixture are determined: fsub(CFsub(3)Br)=(29+-3)%, fsub(Csub(3)Hsub(8))=(71+-3)%. Relative parts of events on ^{12}C, ^{19}F, ^{80}Br: Wsub(C)=0.63+-0.03, Wsub(F)=31+-0.03, Wsub(Br)=0.06+-0.04. Proton average multiplicities at the interaction of π^-- meson with ^{19}F and ^{80}Br nuclei are estimated: < n >sub(F)=2.15+-0.07, <n.e.t.sub(Br)=6.6+-0.3.

10587 (JINR—1-82-683) Some methodical problems of processing events with V^0-particles in the propane bubble chamber exposed to carbon nuclei. Arakelyan, S.G.; Kechechyan, A.O.; Martynov, A.S.; Rodionov, A.I.; Rozhdestvenskij, A.M.; Temnikov, P.P.; Timonina, A.A.; Shakhbazyan, V.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy). 1982. 8p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704174.

Methodical problems of selection, measurement and identification of events with the production of V^0-particles in interactions of carbon nuclei with pc=4.2 GeV/u momentum are investigated. The accuracy of measurement of charged particle parameters are considered, relative root-mean-square error in determination of monentum is equal to (9.2+-0.1%) for non-stopped particles and (3.0+A 0.6%) for particles stopped in a chamber. The identification of V^0-particles is described. It is shown that the chi^2-distribution with the scale coefficient $\alpha=0.8$ is in good agreement with theoretical form for 3 deg of freedom. Selection of hypotheses for ambiguously identified V^0-particles was carried out. Mean values of Λ-hyperon and K^0-meson effective masses are determined and their lifetimes are estimated. The obtained values are in good agreement with the tabular ones.

10588 (JINR—1-82-729) Data readout system for the "Hyperon" spectrometer proportional chambers based on the K405KhP1 hydrid microcircuit. Pilyar, A.V.; Semenov, A.A.; Sergeev, S.V.; Feshchenko, A.A.; Flyagin, V.B.; Spalek, J. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1982. 7p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704175.

The electronics for a large-scale proportional chamber is described. The main part of the system is a special purpose integral circuit. Detecting and reading out circuits are placed on chambers. The infornation from the chambers goes via CAMAC module "Decoder" to a standard CAMAC module encoder. The maximum of wires serviced by the system is 8192. The total processing time for 1% "hit" wires is 2.825 ms. The system has been in operation during one year at "Hyperon" spectrometer.

10589 (JINR—13-82-818) Large-aperture gas Cherenkov counter with wave shifter. Gorchakov, O.E.; Kulikov, A.V.; Trusov, S.V.; Karpukhin, V.V.; Sidorova, V.I. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1982. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704176.

A gas threshold Cherenkov counter having an aperture of 1x0.5 m is described. The counter has been designed for detection of electrons (positrons), distributed in the +-10 deg angular range. It is filled with freon-12 at atmospheric pressure. Photomultipliers with inlet window made of usual glass and Cherenkov light spectrum shifters enlarging the output signal by 1.5 times are used. The counter has 2 mirrors, each with dimensions of 750x600 mm having the form near the elliptical one, the curvature of mirror may be changed. A deviation of the amplitude from the mean value due to variation of particai exit coordinates does not exceed +-8.5%.

10590 **(JINR-R—13-82-634) Fast multiwire proportional chambers for low-background separation of muon stops in a liquid tritium target.** Konin, A.D. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). 1982. 10p. (In Russian). (CONF-8209171—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704177.

From International symposium on multiwire detector application; Prague, Czechoslovakia (1 Sep 1982).

Solutions of some problems connected with the development of multiwire proportional chambers (MWPC) suitable for separation of muons stopped in a "thin" target, when working on intensive beams, are described. MWPC are developed which have the shape of discs and are intended for work with targets of small thickness, and MWPC having the form of a cylindrical tube for work with volume targets of low density. The cylindrical MWPC is intended for separation of muon stops in liquid tritium target when studying mesoatomic and mesomolecular processes in tritium and in its mixtures with other hydrogen isotopes. Specific attention is paid to increasing the time resolution of MWPC. A plane MWPC with 12 mm gap, filled with methan upto 1 atm, at $2x10^4$ gas amplification was tested under working conditions, and 100% efficiency with 30 ns time resolution was achieved. Reliable and stable operation of MWPC in many days experiments is shown.

10591 **(JINR-R—13-82-893) 500x500x40 mm threshold Cherenkov counter with the radiator of amino-G-acid aqueous solution.** Kuptsov, A.V.; Luchan, L.; Nemenov, L.L.; Kurochkin, V.P. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems). 1982. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704178.

A 500x500x44 mm threshold Cherenkov counter with the radiator of amino-G-acid aqueous solution and with a flat light guide is described. Light is detected in the counter with three photomultipliers placed in line on the larger side of the light guide. The amplitude resolution of the counter full width half maximum obtained on relativistic electrons is approximately 50 %. Dependences of the pulses amplitudes and the counter efficiency upon the velocity of particles passing through the counter are given.

10592 **(JINR-R—13-82-905) Method for improvement of gamma-transition cascade spectra amplitude resolution by computer processing of coincidence codes.** Sukhovoj, A.M.; Khitrov, V.A. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). 1982. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704581.

A method of improvement of amplitude resolution in the case of record of coinciding codes on the magnetic tape is suggested. It is shown on the record with Ge(Li) detectors of cascades of gamma-transitions from the $^{35}Cl(n, \gamma)$ reaction that total width at a half maximum of the peak may decrease by a factor of 2.6 for quanta with the energy similar to the neutron binding energy. Efficiency loss is absent.

10593 (KFKI—1983-21, pp 1-21) **Mathematical modelling for experimental physics data processing.** Tikhonov, A.N.; Galkin, V.Ya. (Moskovskij Gosudarstvennyj Univ. (USSR)). Mar 1983. (In Russian). NTIS (US Sales Only), PC A09/MF A01.

In Collection of scientific papers in collaboration with Joint Institute for Nuclear Research, Dubna, USSR and Central Research Institute for Physics, Budapest, Hungary. Algorithms and programs for solution of some problems in physics.

Statistical models for experimental physics data processing, mostly for gamma interactions, are presented. Mathematical models of automatic measurements, hardware influence, multiplicity nuclear processes separation, Moessbauer spectroscopy and gamma-radiation kinetics are studied. Some direct and inverse problem formulations and solution results are discussed.

10594 **(KFKI—1983-45) Neutron sensitivity studies of LiF and $CaSO_4$ thermoluminescent detectors.** Szabo, P.P.; Palfalvi, J. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Apr 1983. 22p. (In Hungarian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704582.

The neutron sensitivity of LiF discs, ^7LiF, $CaSO_4$:Dy and $CaSO_4$:Tm powder was investigated at the neutron energies of 2 keV, 24 keV and 144 keV and with thermal neutrons. The neutron irradiations were carried out at the NBS reactor, Washington D.C., USA. The neutron sensitivities of the irradiated TL detector materials were measured at various neutron fluxes and tabulated for different materials at different neutron energies. The results should be regarded as upper limits of neutron sensitivities, due to the activation of TL detectors and the small but significant self-doses and to some other background effects.

10595 **(KFKI—1983-46) Theoretical and experimental studies of the efficiency of a solid-state track detector utilizing (neutron, alpha) reactions.** Palfalvi, J. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Apr 1983. 23p. (In Hungarian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704583.

The neutron sensitivity of Kodak-Pathe LR 115 II type cellulose nitrate track detectors with different (n,α) radiators was investigated by calculations and measurements. The α counting efficiency using an optical microscope is 95% for α particles with maximum energy of 2 MeV. When using an image analyzer the etched through-tracks (holes) with diameters greater than 2 μm are counted. The efficiency then depends only on the original and removed layer thickness but not on the etching temperature within the range of 40 to 60 deg C and the 2.5 to 6 N normality of the NaOH etchant. Efficiency varies from about 3 to 20% for alphas from the $^6Li/n$, $+a/T$ reaction if the removed layer lies in the range of 7 to 10 μm, and varies from 2 to 10% for $^{10}B/n$, $\alpha/^7Li$ reaction alphas when the layer re--moval is 8 to 10 μm.

10596 (KIYI—81-10, pp 3-6) **Specifications of silicon semiconductor detectors for isotopic composition study.** Alekseev, N.V.; Vakulov, P.V.; Denisov, Yu.I.; Shcherbovskij, B.Ya. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Dependences of energy releases of charged particles in detectors on the thickness of the sensitive region have been used to determine thickness and uniformity of the detector sensitive regions as well as their input and output non-sensitive layers. Detector irradiation by a beam of monochromatic electrons from β-spectrometer or radioactive source has been one of the methods for thickness determination. For detectors with less than 0.1 mm thickness of sensitive region the thickness has been determined under detector irradiation by protons or by α-particles accelerated in a cyclotron. Determination of thicknesses of thin non-sensitive layers has been determined by peak shift from α-particles with $E_0=5.15$ MeV from the ^{239}Pu source inciding on the detectors at the angles of 90 and 30 deg to the sensitive surface. Thickness of outler windows of pass age diffusion-drift detectors is determined by the peak shift of conversion electron lines of ^{137}Cs or ^{207}Bi β-sources.

10597 (KIYI—81-10, pp 7-8) **Semiconductor nuclear emission detector using at gamma activation analysis of the environmental objects.** Gruzin, P.L.; Danilovich, S.N.; Kolesnikov, A.S.; Litvitskij, A.M.; Samonov, A.M. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

A possibility of using gamma-activation method with application of semiconductor detectors for environmental object analysis is investigated. Sample irradiation has been conducted in the accelerator with 30 MeV electron energy. Ge(Li) detector has been used to determine hard gamma radiation, soft gamma radiation has been determined using the BDRK-1-25 type detector. The investigations have revealed that gamma-activation analysis using the BDRK type detector can be conducted for elements with atomic number more than 23. For a series of elements (Cu, Co, Ag, Rb, Hg) the given technique has certain advantages as compared with traditional methods of gamma-activation analysis.

10598 (KIYI—81-10, pp 9-12) **Anticompton γ-spectrometer based on Ge(Li)-detector of special design.** Abele, Ya.Eh.; Golavskij, Eh.V.; Kashevarov, V.L.; Pavlenko, L.N.; Rzhanov, E.V.; Sokol, G.A.; Stukov, O.I.; Tomchakov, V.K. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

An anticompton γ-spectrometer with a protective plastic scintillator is described. Assurance of detection effectiveness of total absorption peaks and fast response are the main advantages of this spectrometer. Besides, high hydrogen content in the protective scintillator promotes effective moderation of neutrons excluding shower formation from γ-quanta and high energy electrons as well as guided activity from the neutron background.

10599 (KIYI—81-10, pp 13-16) **Fast spectrometer on the base of industrial Ge(Li) detector.** Kashevarov, V.L.; Petlin, G.N.; Rzhanov, E.V.; Sokol, G.A.; Stukov, O.I.; Tomchakov, V.K. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

An industrial sample of the DGDK type Ge(Li)-detector with one open end, with capacitive detector-preamplifier communication has been used as γ-spectrometer capable of operation under the conditions of large background loadings and having a rather high energy resolution. A plastic scintillation counter has been included in the scheme of fast coincidences. The obtained dependences of time and energy resolutions on loadings point out slight worsening of γ-spectrometer characteristics up to 10^5 pul./s loadings that provides its use in the experiments in accelerators at this level of loadings.

10600 (KIYI—81-10, pp 17-19) **Silicon detectors and modules for X-ray and soft γ-radiation spectrometry.** Pod"yachev, V.N.; Shchebiot, U.V. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Semiconductor detectors (SCD) intended for spectrometry of X-ray and soft gamma-radiation are produced using monocrystals of monosilane and non-dislocation silicon. It is shown that electric and radiometric parameters of SCD produced of monosilane Si slightly differ from each other despite different design and technology while SCD on the base of non-dislocation Si have better characteristics.

10601 (KIYI—81-10, pp 23-24) **Automatic control of amplification drift and discrimination threshold in problems of complex γ-spectra processing.** Novikov, A.I.; Zakharchuk, O.V. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Use of semiconductor detectors under processing of complex γ-spectra is studied. Sources of errors in the computer analysis of γ-spectra are analyzed and ways of their removal using computer correction of spectra are suggested.

10602 (KIYI—81-10, pp 25-27) **X-ray spectrometers with semiconductor detectors operating under increased loadings.** Gimanov, V.P.; Goganov, D.A.; Mochulov, E.N.; Kosse, A.I.; Ignat'ev, O.V.; Novisov, B.S.; Shkola, N.F. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Peculiarities of spectrometer operation at increased input statistical loadings are considered. Si- and Ge-detectors, preamplifiers with continuous and pulsed feedback are used in the spectrometer. Dependences of energy resolution, output counting rate on output loading at different constant formation and type of feedback are revealed.

10603 (KIYI—81-10, pp 28-30) **Germanium spectrometers of X-ray and soft γ-radiation.** Bezymyannykh, B.M.; Novikov, S.R.; Pershikova, T.M.; Sedov, N.Ya.; Tukhkonen, L.M.; Shishkina, G.A. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Designs and technology of X-ray and soft gamma-radiation spectrometer production on the base of Ge(Li)-detectors of two type : with lateral input window and surface-barrier transition are described. Lateral surface of Ge(Li)-diode is used as an input window. Operation of the flattening drift was conducted during 20-30 hours at gradual decrease of the detector temperature and increase of the flattening field. These modes permit to obtain the input window thickness of the order of 1-2 μm. Energy resolution of the spectrometer with Ge(Li)-detector having 70 mm^2 window square made up 370 eV for 6.4 keV, 480 eV for 59.6 keV and 580 eV for 122 keV. Thin input window of the detector with surface-barrier transition is obtained by producing surface barrier by gold spraying on a preliminarily drifted germanium detector. The best resutls in energy resolution of these spectrometers with detectors having 25 mm^2 square of the sensitive region and 7 mm drift depth made up 250 eV for 5.9 keV, 277 eV for 14.4 keV and 500 eV for 122 keV.

10604 (KIYI—81-10, pp 37-40) **Multicomponent telescope based on p-Si for spectrometry and identification of the charged medium energy particles.** Balakin, V.D.; Barabash, L.I.; Berdnichenko, S.V.; Kibkalo, T.I.; Kirnas, I.G.; Litovchenko, P.G. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Experimental data on spectrometry of charged particles by means of a semiconductor telescope are presented. Completely leaned silicon detectors on the base of extremely pure and compensated silicon are used in the telescope as multicomponent detectors. The obtained results on energy resolution reveal advantages this type of telescopes caused by increased radiation and time stability of multi-component detectors made of p-silicon with thin inlet and outlet non-sensitive layers.

10605 (KIYI—81-10, pp 31-33) **Semiconductor X-ray spectrometers for electron probe devices.** Kostin, V.A.; Mazurik, N.E.; Novikov, S.R.; Pustovojt, A.K.; Sedov, N.Ya.; Gimanov, V.P.; Kholodova, L.A. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

Problems associated with further improvement of the design and parameters of earlier developed semiconductor spectrometers (SCS) for their application in the MR-4 microanalyzer and raster electron microscopes MAK-1, MAK-2 are considered. Presented are the spectrum sections for the samples obtained at MR-4 microanalyzer excitation by electron beam and characterizing the basic advantages and shortcomings of SCS application in electron-probe analysis. The shortcomings comprise increased level of electron bremsstrahlung background, imposition of Ksub(α) lines of neighbouring elements at low energies and Ksub(α)(Z+1) on Ksub(β)(Z) at higher energies, difficulty in detection of weakly intense lines on the background of neighbouring highly intense ones.

10606 (KIYI—81-10, pp 20-22) **Determination of number of α-active nuclei in targets by means of a semiconductor 2πα-detector.** Voronin, A.S.; Lashaev, S.I.; Solov'ev, S.M.; Soloshenkov, P.S. 1981. (In Russian). NTIS (US Sales Only), PC A04/MF A01.

In Semiconductor detector application in nuclear physics experiments.

A possibility of determining the number of nuclei in targets the thickness of which makes up a noticeable part of α-particle path is considered. Spectra of α-particles on four targets of different thickness of uranium-236 oxide-monoxide have been measured under real conditions by means of 2πα-detector. Targets on aluminium substrates with 24 mm diameter with 10 mm diameter active layer have been produced using the method of multiple smear with

intermediate annealing. It is shown that the target weight with the density up to 2 mg/cm^2 with the error of about 1% can be determined using the $2\pi\alpha$-detector.

10607 **(LAPP-EXP—82-03) Large drift tube arrays with external delay line readout.** Broll, C.; Declais, Y.; Favier, J.; Lebeau, M.; Moynot, M.; Perrot, G.; Charveys, A. (Grenoble-1 Univ., 74 - Annecy (France). Lab. de Physique des Particules). Aug 1982. 32p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704179.

The construction and performance of 2 meter long, 5 cm diameter, circular drift tubes made of 1 mm thick bakelite paper coated inside with conductive paint. The longitudinal coordinate is read-out with an external delay line system. The measured spatial resolution obtained from the drift time is close to 180 μm (one standard deviation). A system of 1100 tubes has been built for a muon experiment.

10608 **(LBL—15958) Interactive parallel processor for data analysis.** Meng, J.; Weaver, D.; Maples, C.; Rathbun, W.; Logan, D. (Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 7p. (CONF-831015—32). NTIS, PC A02/MF A01 . Order Number DE84004311.

From Nuclear science symposium; San Francisco, CA, USA (19 Oct 1983).

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A parallel array of eight minicomputers has been assembled in an attempt to deal with kiloparameter data events. By exporting computer system functions to a separate processor, we have been able to achieve computer amplification linearly proportional to the number of executing processors.

10609 **(LBL—16799) Plastic box: a 4π detector for intermediate energy heavy ion physics.** Van Bibber, K.; Countryman, P.J.; Murphy, M.J.; Chan, Y.D.; Stokstad, R.G.; Tserruya, I.; Wald, S. (Stanford Univ., CA (USA). High-Energy Physics Lab.; Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 8p. (CONF-831015—30). NTIS, PC A02/MF A01. Order Number DE84004658.

From Nuclear science symposium; San Francisco, CA, USA (19 Oct 1983).

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A 4π array of plastic scintillator has been constructed and used in conjunction with high resolution solid state detectors. The array is employed principally to discriminate multinucleon transfer reactions from three-body (or more) final states. It should be useful for a broad class of experiments in which a global charged particle anticoincidence is required.

10610 **(LBL—16926) Technology of high luminosity detectors.** Loken, S.C. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 13p. (CONF-830822—48). NTIS, PC A02/MF A01. Order Number DE84004240.

From 12. international conference on high energy accelerators; Batavia, IL, USA (11 Aug 1983).

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The Workshop on Collider Detectors: Present Capabilities and Future Possibilities focused on the problems posed by high luminosity and high energy at hadron colliders. Four working groups considered problems in individual detector elements, tracking chambers, calorimeters, triggers and particle identification devices. A fifth group reviewed the general problems of detector systems. The working groups concluded that there are technical solutions for the problems of a luminosity of 10^{33} cm^{-2} sec^{-1}. Everything is difficult and continued R & D is necessary to improve detectors.

10611 **(ORNL/TM—8986) New vistas of heavy-ion reactions with the spin spectrometer.** Halbert, M.L. (Oak Ridge National Lab., TN (USA)). Jan 1984. Contract W-7405-ENG-26. 44p. NTIS, PC A03/MF A01. Order Number DE84005081.

The Spin Spectrometer is a 4 pi array of 72 large sodium iodide detectors. Its purpose is to register essentially all the gamma rays associated with a nuclear reaction. The sum of the measured pulse heights gives the excitation energy of the residual nucleus after all particle emissions has occurred - the entry state. If the angular momentum carried away by each gamma ray is known, then a simple count of the number of detectors that fired gives a good estimate of the spin of the entry state - hence the name Spin Spectrometer. Highlights are given of 20 experiments of 10 different types carried out with the instrument. The first experiment was to measure the entry-state distributions in compound-nucleus evaporation reactions. Examples are given of similar data for systems where fission of the compound nucleus is important. Entry lines and nuclear shapes are shown. The gamma ray angle information can be used to determine the nuclear spin direction on an event-by-event basis. Another experiment concerns few-nucleon transfer in deformed nuclei. Some experiments were done to study the entry states associated with nonequilibrium emission of fast particles in heavy-ion reactions. Neutron and gamma decay in giant resonances were also studied. (LEW)

10612 **(PNL-SA—11338) Passive neutron counter for determination of transuranics in high gamma activity samples.** Rogers, L.A.; Brown, D.P.; Brodzinski, R.L. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 12p. (CONF-831015—31). NTIS, PC A02/MF A01. Order Number DE84004830.

From Nuclear science symposium; San Francisco, CA, USA (19 Oct 1983).

A very sensitive neutron counting instrument is described which can determine the presence of small quantities of transuranic materials in samples emitting extremely high levels of gamma radiation and which can determine the isotopic content. The detector is of modular design to facilitate disassembly for maintenance or decontamination as necessary, and consists of radiation shields both internal and external to a neutron counter module. The counter module is an annular array of 80 $^{10}BF_3$ proportional counting tubes arranged in two concentric rows of 40 tubes which are surrounded by a polyethylene moderator. The electronic circuitry permits measurements to be made in two distinct modes: a coincidence mode for isotopic composition measurements, and a spatial mode for determining the physical distribution of the transuranics within the sample. (LEW)

10613 **(PNL-SA—11804) Status of the Battelle-Carolina ^{76}Ge double beta decay experiment.** Moore, R.S.; Avignone, F.T. III; Brodzinski, R.L.; Brown, D.P.; Evans, J.C. Jr.; Hensley, W.K.; Reeves, J.H.; Wogman, N.A. (Pacific Northwest Lab., Richland, WA (USA); South Carolina Univ., Columbia (USA)). Sep 1983. Contract AC06-76RL01830. 9p. (CONF-8309163—4). NTIS, PC A02/MF A01. Order Number DE84004837.

From Conference on low energy tests of conservation laws in particle physics; Blacksburg, VA, USA (12 Sep 1983).

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A new detector for the measurement of ^{76}Ge double beta decay is described. The detector system will consist of a 1440 cm^3 mosaic Ge detector with anticoincidence shielding, and the experiment will be performed deep underground. 12 references. (WHK)

10614 **(RL—82-120) First measurement of efficiency and precision of CCD detectors for high energy physics.** Bailey, R.; Damerell, C.J.S.; English, R.L.; Gillman, A.R.; Lintern, A.L.; Watts, S.J.; Wickens, F.J. (Science Research Council, Chilton (UK). Rutherford and Appleton Labs.). Dec 1982. 39p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704181.

The performance is reported of a telescope of three two-dimensional charge-coupled device detectors used in a test beam of 5 GeV/c π^- at the CERN PS. The results indicate an efficiency for track detection of 98 +- 2% per plane, spatial resolution of 4.3 μm and 6.1 in two orthogonal directions and 2-track resolution of 40 μm in space.

10615 **(SSI-A—82-19) Calibration of radon daughter recorders.** Falk, R.; Nyblom, L. (Statens Straalskyddsinstitut, Stockholm (Sweden)). 14 Mar 1983. 10p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704584.

Technique for the absolute determination of the efficiency of alpha-detectors when measuring the content of radon daughters by

means of the filter method is described. Some of the particular physical properties of the short-lived radon daughters are utilized. The reference test of the efficiency is performed in the same way as the real test. The method is based on the activity content of a reference solution of radon and radon daughters, and could be standardized.

10616 **Studies with encapsulated sources of ^{125}I. III. Microdosimetry using a non-metallic wall-less proportional counter.** Kliauga, P.J.; Rossi, H.H. (Inst. of Cancer Research, New York, NY). *International Journal of Radiation Oncology, Biology and Physics;* 8: No. 11, 1963-1968(Nov 1982). Contract AC02-78EV04733.

A significant problem in measurement of microdosimetric spectra of low energy X rays has been the perturbing influence of the counters used in experiments. The conventional proportional counters used in microdosimetry have employed electrode structures of stainless steel. Since photoelectric cross-sections are highly sensitive to atomic number (approximately proportional to z^4), the photoelectrons, emitted from the steel structures, with correspondingly higher energies, may dominate over the softer Compton electrons emitted from the wall and gas. This is more serious for a wall-less type of counter, in which metallic supporting structures may contribute an additional source of photoelectrons entering the sensitive region. In order to perform accurate measurement with ^{125}I photons and other soft X rays having energies less than 100 keV, a special counter was constructed having no metal parts. The construction is of the grid-defined "wall-less" type, contained inside a plastic spherical shell. The plastic was chosen to match the energy absorption coefficient of tissue at 25 keV as closely as possible; therefore, conventional tissue-equivalent A-150 was replaced by an "air-equivalent" type, C-552, which at 25 keV matches tissue to within a few percent. This material, based on the plastic polyvinylidene fluoride has additional advantages in terms of tensile strength and rigidity, for the purpose of molding delicate structures. The gas used was a propane-based tissue-equivalent type, modified to match the plastic. A human hair, coated with graphite, was used as the central collecting wire. The construction and details of this detector are described, and measurements are reported of ^{125}I and 60 keV photons from ^{241}Am, as well as high energy photons from ^{137}Cs and ^{60}Co.

10617 **The role of prior information in radiation spectrum unfolding problems.** Chambless, D.A.; Broadway, J.A. (Auburn University at Montgomery, Montgomery, AL 36193). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1938-1944(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

In this paper the authors first briefly review the mathematical difficulties usually experienced in radiation spectral unfolding computations; the source of these difficulties is identified as the discontinuity of the inverse of the unfolding operator. Then two techniques are proposed for use in alleviating this intrinsic instability of unfolding computations: these are the mathematical regularization technique and the application of nonnegativity constraints. In sample results obtained from silicon surface-barrier alpha particle detectors, the combination of these two techniques has proven to be a very powerful method of improving the resolution of the unfolded spectra while retaining good stability and low incidence of artifacts. Possible advantages of the method include the reduction of counting time required in many instances.

10618 **Proton and neutron radiative capture.** Weller, H.R.; Roberson, N.R. (Duke Univ. & Triangle Universities Nuclear Lab., Durham, North Carolina 27706). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1268-1272(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The development of large NaI detection systems having a resolution near 3% for about 20 MeV Y-rays has been a crucial factor in determining the quality of the data obtained in recent experimental studies of proton and neutron capture reactions. In addition to allowing experimenters to obtain reasonably good statistics on well resolved capture lines leading to the ground state of the final nucleus, these detectors have permitted the study of capture to excited states as high as about 20 MeV in the final nucleus. After presenting a description of the detector system employed at the Triangle Universities Nuclear Laboratory (TUNL), including calibration and operating characteristics, three examples of the use of such detector systems are given. The first example summarizes the results of the authors' recent study of $^{13}C(\rightarrow p,\gamma_1)^{14}N$. In this experiment the use of polarized protons allowed the extraction of the E2 capture cross section. Secondly show the preliminary results of the $^{13}C(\rightarrow n,\gamma)^{14}C$ experiment presently underway in our laboratory. It will be seen that whereas the E2 cross section observed in proton capture is obscured by direct E2 strength, no such term is present for neutron capture. Finally the authors describe recent work on the $^{7}Li(p,\gamma)^{8}Be$ reaction in which they have studied the capture to the 2^+ isospin mixed state(s) in ^{8}Be near 16.6 MeV. The results are compared to a direct capture calculation. Some possible future experiments are suggested.

10619 **Pulse height response of Cd-Te to heavy ions.** Becchetti, F.D.; Entine, G.; Hamill, J.J.; Peterson, R.J.; Ristinen, R.A.; Thorn, C.E. (University of Colorado, Boulder, CO 80309). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1546-1547(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The properties of Cd-Te as a high-Z, moderate resolution, room temperature, photon detector are well documented. Little is known about its suitability for detection of energetic charged particles, however. The high stopping power and room temperature operation make Cd-Te attractive as an alternate to Si as a charged-particle detector. Also, nuclear stopping and channeling, which result in peak shape distortions in Si detectors for heavy ions, should differ for Cd-Te, and may make the latter more suitable in some applications. Pulse height spectra for alpha particles, fission fragments, and oxygen ions have been obtained for a thin-window surface-barrier Cd-Te detector. Although the detector can exhibit a large pulse-height defect and poorer resolution than Si detectors, it is still usable in many applications. In addition, the high stopping power of Cd-Te makes it suitable for simultaneous detection of energetic light and heavy ions, as well as γ rays, with a simple compact room-temperature detector.

10620 **Calculation of detection efficiency for beryllium-8.** Wolfe, G.W. (University of Mississippi, University, MS 38677). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1551-1553(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A method has been developed, using Monte-Carlo techniques, to calculate the detection efficiency for ^{8}Be particles from either solid or gaseous targets, using single detectors, binocular detectors, or position sensitive detectors. As a demonstration of the method, the $^{24}Mg(\alpha,^{8}Be)^{20}Ne$ reaction was attempted at an alpha energy of 65 MeV. The efficiency calculation above is shown to be in general agreement with other similar work.

10621 **Time-of-flight position-sensitive x-ray detection.** Mowat, J.W. (North Carolina State University, Raleigh, North Carolina). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1563-1566(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A new method for recording beam-foil time-of-flight data is described. A stationary, side-window, position-senstive proportional counter, oriented with anode wire parallel to the ion beam, views the decay in flight of excited ions through a Soller slit x-ray collimator. In contrast to the standard method, the exciter foil, placed within or upstream from the field of view, is not moved during the acquisition of a decay curve. Each point on the anode acts like an independent detector seeing a unique segment of the ion beam. The correspondence between the downstream distance at which an ion decays and the position along the anode at which the x-ray is de-

tected makes a pulse-height spectrum of position pulses equivalent to a time-of-flight decay curve. Thus an entire decay curve can now be acquired without moving the foil. Increased efficiency is the most significant improvement over the standard method in which the radiation detector views only a small segment of the flight path at any one time. Experiments using translating foils are subject to a spurious dependence of x-ray intensity on foil position if the foil is non-uniform (or non-uniformly aged) and wobbles as it moves. This effect is eliminated here. Foil aging effects which influence excitation rates and introduce a slowly varying time dependence of the x-ray intensity are automatically normalized by this multichannel technique. The application of this method to metastable x-ray emitting states of low-Z ions are discussed.

10622 **Single surface barrier detectors for neutron dosimetry and associated light-ion fluxes.** Treado, P.A.; Allas, R.G.; Eman, B.; Lambert, J.M.; Slaus, I. (Georgetown University and Naval Research Laboratory, Washington, DC). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1570-1574(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

In this paper the authors have attempted to perfect a simple, compact and inexpensive single surface barrier detection system to measure both the intensities and approximate spectral shape of continuous neutron and light ion fluxes. They have measured such fluxes for three known collimated and uncollimated neutron beams with two geometrical configurations and with at least two different thicknesses of CH_2 and CD_2 radiators. All neutron flux data were obtained with a Au shield in front of the detector; this was removed for LIF measurements. The known shapes of the impinging neutron beams were used to calculate the expected recoil-particle spectra and such predictions have been compared with the experimental data. Also, data have been obtained with telescopes, with carbon foil and thin detector-grade silicon foil radiators. These data allow the authors to estimate contributions to the higher-energy portion of the recoil-particle spectra from reactions due to the carbon in the CH_2 and CD_2 radiators and due to the silicon in the detector. Corrections for rim effects in the detector and multiple scattering in the radiator are calculable. The precipitous decrease in the number of observed events, expected at the maximum energy that can be deposited by a recoil particle from the radiator, was observed for each of the radiator/detector combinations studied. The data agree reasonably well with both the intensity and spectral shape predictions for recoil-particle energies above about 300 keV. The telescope data confirm the single-detector data and add significant information about the LIFs created by the collimation of the neutron beams. In fact, both the single-detector and telescope data indicate that (n,p) reactions in collimation and target-backing materials contribute significant proton components to the light-ion fluxes.

10623 **Accelerated color development of irradiated radiochromic dye films.** Chappas, W.J. (Univ. of Maryland, College Park, Maryland 20742). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1784-1785(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The radiochromic dye films developed by Chalkley and McLaughlin are quickly becoming one of the principal methods for secondary dosimetry. Their useful dose and dose rate ranges, long-term color stability, small and flexible size, and ease of reading make them ideal for spatial dose distribution measurements in the complex targets often encountered in industry. At room temperature, however, their response is slow, requiring several hours after irradiation for full color development. This work examines the effect of humidity on the film's time response and describes a method for accelerating the film's color development. By keeping the film in a controlled humidity environment or through a simple heating technique, the film can be read in minutes instead of hours after irradiation. The results are shown to be identical to those of films stored for 24 hours at room temperature.

10624 **An in-situ neutron activation analysis system for assaying metal ores.** Goldman, L.H.; Schneider, G. (P.O. Box 641, Princeton, NJ 08540). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1706-1709(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The topic of this paper is a method of in-situ neutron activation using high resolution gamma ray spectroscopy and a californium 252 neutron source. The paper is divided into three parts: a description of the authors' high resolution gamma ray spectrometer probe, results to date using a Cf-252 source and applications made possible by a small accelerator. The basic tool of measurement is the PGT probe - a high resolution gamma ray spectrometer that incorporates an intrinsic germanium detector and a computerized multichannel analyzer. The system is capable of operating at data rates as high as 100,000 counts per second and can record 4000-channel gamma ray spectra in-situ. The probe is 2.5 inches diameter and 12 feet long. All data are transmitted digitally over standard 4-H-O armored cable to a computer-based logging system. Complete analysis can be performed on site.

4402 Radiation Effects On Instrument Components, Instruments, Or Electronic Systems

REFER ALSO TO CITATION(S) 10290

10625 **(AD-A—132738/6) High performance fiber optic telemetry link for use in a space radiation simulator. Technical report.** Blackburn, J.C.; Vanderwall, J.; Gilbert, R.M. (Harry Diamond Labs., Washington, DC (USA)). Jul 1983. 55p. NTIS, PC A04/MF A01.

The transmitting end of the fiber optic link is designed to operate in a nuclear and space radiation simulator. It will function without noise increase or other degradation at up to approximately 10 to the 8th power rads (Si)/s of 1-MeV gamma rays and at cryogenic temperatures. The response is linear analog, with a bandwidth of 12 kHz to 350 MHz. Signal inputs are balanced with millivolt sensitivity. All functions are remote controlled through an RS-232 computer interface so that unattended operation is possible. Complete circuit diagrams, a discussion of the design, and test results are given.

4403 Miscellaneous Instruments

REFER ALSO TO CITATION(S) 9264, 9390, 9391, 9392, 10293, 10438, 10444

10626 **(BARC—1145) Apparatus for the determination of molecular weights of actinide complexes.** Nagar, M.S.; Ponkshe, M.R.; Subramanian, M.S. (Bhabha Atomic Research Centre, Bombay (India)). 1982. 13p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704182.

This report describes the fabrication and standardisation of an apparatus called, 'Osmistor' for molecular weight determinations. The set up uses a matched pair of thermistors as temperature sensing device and is based on the principles of relative lowering of vapour pressure of a solution with respect to the solvent exposed to the same temperature. The instrument was calibrated using standard solution (0.01 to 0.08 M) of A.R. benzil in three different solvents, viz, benzene, acetone and chloroform at a temperature of 38.0, 25.0 and 25.0 +-0.01deg C respectively and the calibration constant K was determined. The molecular weight of naphthalene in the above solvents was determined with a precision and accuracy of +- 3%. Also, the molecular weights of a few synergistic uranyl complexes were determined with an accuracy of about 5%.

10627 **(BNL—33744) Neutron and synchrotorn x-ray small angle scattering instruments for applications in biology at the Brookhaven National Laboratory.** Schoenborn, B.P.; Wise, D.S.; Schneider, D.K. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 22p. (CONF-830246—1). NTIS, PC A02/MF A01. Order Number DE84002867.

From Annual meeting of the American Crystallographic Association; Columbia, MO, USA (1 Feb 1983).

Portions are illegible in microfiche products.

Facilities for small angle x-ray and neutron scattering are described, with emphasis on the characterization of the primary beam of the neutron instrument and the spectrometer control logic of the synchrotron instrument. (LEW)

10628 **(BNL—34014) X-ray holographic microscopy experiments at the Brookhaven synchrotron light source.** Howells, M.R.; Iarocci, M.; Kenney, J.; Kirz, J.; Rarback, H. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Stony Brook (USA)). 1983. Contract AC02-76CH00016. 12p. (CONF-8310172—10). NTIS, PC A02/MF A01. Order Number DE84004289.

From Advances in soft x-ray science and technology conference; Upton, NY, USA (17 Oct 1983).

Soft x-ray holographic microscopy is discussed from an experimental point of view. Three series of measurements have been carried out using the Brookhaven 750 MeV storage ring as an x-ray source. Young slits fringes, Gabor (in line) holograms and various data pertaining to the soft x-ray performance of photographic plates are reported. The measurements are discussed in terms of the technique for recording them and the experimental limitations in effect. Some discussion is also given of the issues involved in reconstruction using visible light.

10629 **(EGG-M—05183) Instrument failure detection in nonlinear systems.** Tylee, J.L.; Purviance, J.E. (EG and G Idaho, Inc., Idaho Falls (USA); Idaho Univ., Moscow (USA). Dept. of Electrical Engineering). 1983. Contract AC07-76ID01570. 12p. (CONF-831235—3). NTIS, PC A02/MF A01. Order Number DE84005306.

From 22. IEEE conference on decision control; San Antonio, TX, USA (14 Dec 1983).

A simple approach to detecting instrument failures in dynamic systems described by nonlinear continuous differential equations is presented and evaluated. The method uses an extended Kalman filter to generate an innovations (or residuals) vector. Threshold crossing checks on the mean and variance of elements in this vector are used to ascertain existence of failure. The approach is demonstrated using data from a nuclear reactor.

10630 **(JINR—10-82-807) Controller of multichannel pulse analyzer in CAMAC system.** Barahash, I.P.; Shibaev, V.D. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics). 1983. 4p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704187.

The special crate controller in CAMAC system which provides the execution of analyser function by means of the ordinary CAMAC unit: analog-to-digital converter, memory device and interface of printer, is described. The crate controller itself provides the output on graphical and digital displays. Any serial input X oscilloscope can be used for data acquisition control. The CAMAC dataway is used only for information exchange between CAMAC units. Three operating modes are possible: "Data acquisition", "Observation", "Printing".

10631 **(LA-UR—83-3477) Los Alamos real-time and digital radiography plans.** Strong, R.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 4p. (CONF-8310217—2). NTIS, PC A02/MF A01. Order Number DE84004327.

From WANTO meeting; Miamisburg, OH, USA (10 Oct 1983).

Real-time radiography is the conversion of the radiographic image into a video image for display on a TV monitor. Once the image is in video format it is easy to digitize it using one of several digitizing systems. When the image has been digitized, digital signal processing may be performed on the image to enhance it or to assist the radiographer in interpreting. Digital processing may be performed in near real-time of off-line.

10632 **(NP—4770104) Determining the mass flow of gases using a capacitive differential pressure transducer with vibrating membrane.** Luo, R.C. (Technische Univ. Berlin (Germany, F.R.). Fachbereich Verfahrenstechnik). 5 Jul 1982. 162p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE84770104.

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A method for determining the mass flow of gases is described using the loss factor of a membrane capacitor as a differential pressure transducer which is connected to the flow channel before and behind the orifice gauge. The membrane with the parallel electrodes is a differential capacitor. The membrane is caused to vibrate by electrostatical excitation. By its vibration, the membrane induces a pulsed flow through the gauge. Thus damping changes of pressure are induced. The mechanical loss of power of the vibrating membrane caused by the mass flow and the energy from the electrical field, measurable by the stray power of the membrane capacitor, are in balance. Hence the measured loss factor is a measure of the mass flow. The procedure offers the advantage of determining the mass flow independently of density.

10633 **Application of infrared emitting semiconductor diodes to the detection of various gases.** Gerritsen, H.J.; Crisman, E.E.; Daly, J.T. pp 54-63 of 1983 international gas research conference. Hirsch, L.H. (ed.). Rockville, MD; Government Institutes, Inc. (1983). (CONF-830664—).

From International gas research conference; London, UK (13 Jun 1983).

The applicability of infrared emitting semiconductor diodes to the detection of various gases by infrared absorption has been demonstrated. A prototype detector employing an In/sub 1-x/Ga/sub x/As IRED emitting at 3.32 μm has been used to monitor 0.1% methane in air with a signal-to-noise ratio of 20:1. Using an InAs/sub 1-y/Sb/sub y/ IRED emitting near 4.2 μm, detection of carbon dioxide has also been demonstrated. 5 references, 7 figures.

10634 **Position sensitive detection of extreme ultraviolet photons.** Livingston, A.E. (University of Notre Dame, Notre Dame, Indiana 46556). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1559-1562(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Recent advances in photon detection techniques for the extreme ultraviolet region have been highlighted by the introduction of multichannel electron multipliers and image-sensing detector arrays. Current and potential applications for such position-sensitive detectors in vacuum-ultraviolet and extreme ultraviolet spectroscopy are discussed in this paper. Examples are presented of multichannel spectra of several highly-ionized atoms obtained using fast-ion spectroscopy.

4404 Well Logging Instrumentation

10635 **(UCID—19964) Feasibility studies of a carbon/oxygen logging tool for evaluating the CO_2 content of the medium in nuclear device containment.** West, H.I. Jr.; Glasgow, J.E. (Lawrence Livermore National Lab., CA (USA)). Dec 1983. Contract W-7405-ENG-48. 53p. NTIS, PC A04/MF A01. Order Number DE84005227.

The feasibility of using oil-well bore-hole logging techniques for assaying the carbonate content of a potential shot site has been investigated. The procedure makes use of the detection of the 4439-keV γ ray of carbon and the 6130-keV γ ray of oxygen produced by the inelastic scattering of 14-MeV neutrons in the bore-hole medium. For the needs of the containment program, a sensitivity of detection of CO_2 to $\leq$ 0.02 weight fraction must be achieved. Laboratory measurements indicate that only with considerable development effort could a tool be made that would come close to achieving this goal.

45 EXPLOSIONS AND EXPLOSIVES

4501 Chemical

10636 **(DOE/EV/06194—2-Rev.1) DOE explosives safety manual. Revision 1 .** (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety). Dec 1983. 103p. NTIS, PC A06/MF A01. Order Number DE84004295.

This manual describes the Department's explosive safety requirements applicable to operations involving the development, testing, handling and processing of explosives or assemblies containing explosives. It is divided into the following sections: introduction, operational safety, explosives and personnel limits and personnel control, training, quantity-distance and level of protection criteria for explosives activities, operating procedures, formulation scaleup, and insensitive high explosives qualification. (DLC)

4502 Nuclear

REFER ALSO TO CITATION(S) 10635

10637 **(AD-A—132181/9) Analytic models of magnetic field evolution in laser-produced plasma expansions. Memorandum report.** Keskinen, M.J. (Naval Research Lab., Washington, DC (USA)). 31 Aug 1983. 29p. NTIS, PC A03/MF A01.

Analytic models of the magnetic field evolution in laser-produced plasma expansions have been studied and applied to the NRL laser HANE (high altitude nuclear explosion) simulation experiment. Both one- and two-dimensional models have been investigated for laser plasma expansions with and without initial background magnetic fields. For the case with no initial background magnetic field, thermal source mechanisms have been used to discuss the two-dimensional evolution and morphology of spontaneous self-generated magnetic fields. With an initial background magnetic field, one-dimensional models with discontinuous debris density profiles give unrealistically large magnetic field compressions, while predictions from two-dimensional models with smooth profiles are in reasonable agreement with initial NRL experimental observations.

10638 **(LA-UR—83-3520) Little Boy replication: justification and construction.** Malenfant, R.E. (Los Alamos National Lab., NM (USA)). 1984. Contract W-7405-ENG-36. 5p. (CONF-840202—11). NTIS, PC A02/MF A01. Order Number DE84004331.

From 17. midyear topical meeting of the Health Physics Society; Pasco, WA, USA (5 Feb 1984).

A reconstruction of the Little Boy weapon allowed experiments to evaluate yield, leakage measurements for comparison with calculations, and phenomenological measurements to evaluate various in-situ dosimeters. The reconstructed weapon was operated at sustained delayed critical at the Los Alamos Critical Assembly Facility. The present experiments provide a wealth of information to benchmark calculations and demonstrate that the 1965 measurements on the Ichiban assembly (a spherical mockup of Little Boy) were in error.

50 ENVIRONMENTAL SCIENCES, ATMOSPHERIC

5001 Basic Studies

REFER ALSO TO CITATION(S) 10002, 10955

10639 **(BNL—34029) Characteristics of wind direction meander during onshore flow at a coastal site.** Raynor, G.S.; Hayes, J.V. (Brookhaven National Lab., Upton, NY (USA)). 1984. Contract AC02-76CH00016. 6p. (CONF-840137—1). NTIS, PC A02/MF A01. Order Number DE84004178.

From 3. conference on meteorology of the coastal zone; Miami Beach, FL, USA (9 Jan 1984).

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This study documents the occurrence and characteristics of wind direction meander at a coastal site during onshore flows and evaluates the importance of meander in diffusion calculations. 9 references, 6 figures.

10640 **(DOE/EV/10340—1) Assessment of health and environmental effects of energy sources. Final report.** Cooper, R.D. (Maryland Univ., Baltimore (USA)). Mar 1983. Contract AS05-80EV10340. 7p. NTIS, PC A02/MF A01. Order Number DE84005393.

This report evaluates the applicability of zero order methodology to several example energy technologies in order to show its advantages and its shortcomings. The great strength of the zero order method is that it can be applied quickly and is simple enough that the calculations can be easily followed by a non-specialist and is transparent enough that it can be used as a check against complex computer calculations. To estimate potential public health effects of an energy industry using zero order methods only. Source term (effluents released to air and water); dispersion (movement through air and water and through the food chain to man); and health effects per unit material inhaled or ingested need to be entered into the calculations. (DT)

10641 **(DOE/EV/10665—4) Variation of arctic cloud cover in summer: results through February 1983.** Kukla, G.J. (Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory). Dec 1983. Contract AC02-81EV10665. 75p. NTIS, PC A04/MF A01. Order Number DE84005098.

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The variation of arctic cloud cover in time and space during the summer of 1979 was charted from satellite imagery in 3 to 7 day intervals. Twenty-nine charts of the cloud cover in the Arctic Basin were produced, covering the period from May 17 through August 15. Three classes of cloud thickness were separately mapped. Optically thick clouds were found to be considerably less frequent than the estimates based on earlier analyses of ground and drifting station reports. The proportion of the thickest cloud category increased markedly in mid June in connection with a traveling low pressure system which orginated during early June in Central Asia, crossed the Pole on June 13th and dissipated over Baffin Island late in the month. Concurrently, the snow in the Central Arctic started melting with a subsequent drop in surface albedo and bottom melt of the ice floes. Our data show that at least in 1979 the advection of a warm moist continental air mass from Central Asia was instrumental in the establishment of the summer regime in the Central Arctic. Throughout the spring and summer, all over the Arctic Basin there were clear sky episodes lasting long enough to significantly affect the surface radiation balance and the dissipation of snow and ice cover.

10642 **(IAEA-R—2424/F) Isotope characterization of the water vapour in the Amazon region. Final report for the period 1 August 1979 - 31 July 1982.** Matsui, E. (International Atomic Energy Agency, Vienna (Austria)). Oct 1982. 84p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704543.

Samples of atmospheric moisture and of precipitation have been collected daily at two stations in the Amazon Basin, that is Belem, close to the Atlantic coast, and Manaus, approximately 1200 km from the ocean. The deuterium and oxygen-18 contents have been determined in these samples. The isotopic composition of the atmospheric moisture varies generally in parallel with that of precipitation. The isotopic data show the occurrence of at least three seasons in the hydro-meteorology of the Central Amazon Basin. The period of moderate rains (usually less than 25mm/day) from June to late September show rather constant isotopic values. From October to November significantly more negative delta values occur occasionally, especially at Manaus, which are uncorrelated with events at the other station. The period January-April (occasionally extending from December to May) is characterised by periods with rains extremely depleted in heavy isotopes. In spite of the isothermy of the area and lack of clearcut frontal systems, the data

suggest that many of the rainy episodes are related to events imposed on the basin from outside and that only the winter period is predominantly influenced by the internal processes within the basin. Presumably then, winter is the season whose precipitation pattern would be most influenced by any deforestation program in the basin.

10643 (MST-LUFT-A—47) Numerical treatment of the advection-diffusion equation. Part 1. Space discretization. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). May 1981. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83751363.

Mathematical modeling of some problems connected with long range transport of air pollutants leads to the solution of time-dependent partial differential equations. The first step in the numerical solution of these equations is the discretization of the space derivatives. By this fundamental step the partial differential equation is transformed into a system of ordinary differential equations. In this report, we show that study of the space differentiation can be quite independently from the partial differential equation. Trigonometric interpolation based on truncated Fourier series has proved to be very efficient for problems arising in meteorology. Two basic results concerning the convergence of the trigonometric interpolation by truncated Fourier series are given and illustrated by numerical examples. The use of double precision versions of the routines which implement the discretization algorithms is motivated and an example is given in order to demonstrate the usefulness of such versions in situations where the accuracy of the calculated results has to be checked.

10644 (MST-LUFT-A—49) Numerical treatment of the advection-diffusion equation. Part 2. Test problems. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Sep 1981. 46p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751364.

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Software designed to handle some mathematical models which are used to treat advection-diffusion phenomena in the atmosphere is in process of development. Such models might be used as well to study transport phenomena in fluids, e.g. in marine environments. The mathematical models require solving hyperbolic partial differential equations in one, two or three space variables. The ability of the software to treat efficiently problems in one and two space variables is illustrated in this report by many numerical experiments. Both problems which described typical meteorological phenomena and problems which are artifically created (but whose solutions can be expressed in elementary terms) have been applied in the tests. Excellent accuracy has been obtained in the cases where the pseudospectral technique is used, even with a relatively small number of grid-points. It has experimentally been found that the increase of the grid-points by a factor of 2 leads to an increase of the computing time by a factor approximately equal to 4 for one-dimensional problems. The increase of the grid-points (in the direction of each axis) by a factor of 2 leads to an increase of the computing time by a factor approximately equal to 8 for two-dimensional problems. The usefulness of the double precision versions of the subroutines in the check for rounding errors in some situations is demonstrated. The numerical results show that both the algorithms used and the subroutines which implement these algorithms can be efficiently applied to handle some mathematical models describing advection-diffusion phenomena.

10645 (MST-LUFT-A—50) Numerical treatment of the advection-diffusion equation. Part 3. Time integration. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Nov 1981. 63p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751365.

Mathematical models described by partial differential equations appear in a study of many different phenomena related to atmospheric transport, i.e. advection and diffusion processes. Truncated Fourier series are often used in the discretization of the space dirivatives resulting in a pseudospectral method. In this way, the partial differential equation is transformed into a system of ordinary differential equations. This system is normally solved by the so-called "step-by-step" numerical methods. The stability properties of these numerical methods are studied. Some bounds for the time-stepsize are derived. Several formulae and predictor-corrector schemes with large stability intervals on the imaginary axis are constructed. Numerical experiments with 8 time-integration algorithms are carried out. Some recommendations concerning the choice of the time-integration algorithms in 3 different situations are given. It is emphasized that in a package for the solution of partial differential equations describing transport porcesses in the atmospheric environment, one should have several different time integration algorithms, each of which can be chosen optionally. Finally, the possibility of using variable stepsize variable formula time-integration algorithms is briefly discussed.

10646 (MST-LUFT-A—57) Numerical treatment of the advection-diffusion equation. Part 4. Multilevel model. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Mar 1982. 54p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83751367.

In many studies of phenomena of long-range transport of air pollutants, it is desirable to account for variable mixing height and variation of wind speed and direction with height. The attempt to design a mathematical model satisfying these requirements leads to a three-dimensional model, or to a multilevel computational scheme in the numerical integration of the mathematical model. Using different splitting techniques, an optimized software which provides both accurate results and efficiency with regard to the computing time has been developed. Pseudospectral algorithms are used in the space discretization, while different axplicit time-integration schemes may be specified during the discretization of the time derivative. Numerical experiments have been carried out. The results are represented by use of graphics. It is demonstrated that the software is capable of treating some simple but typical phenomena during diurnal variations of mixing height, wind speed and wind directions. The efficiency of the software with regard to computing time is briefly discussed. Using a scaler computer (IBM 3033), a typical one-year simulation of sulphur dioxide and sulphate transport over Europe requires about 1 hour CPU time level on a 32x32 grid. The subroutines included in the software are vectorized and a vector computer (CRAY1) does the same simulation about 10 times faster. The model is prepared for simulation of long-range transport of air pollutants.

10647 (MST-LUFT-A—58) Numerical treatment of the advection-diffusion equation. Part 5. Documentation of ADMO1. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Oct 1982. 92p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751369.

Many meteorological phenomena (as for example long-range transport of air pollutants in the atmosphere) can successfully be studied by the use of mathematical models containing advection-diffusion equations. ADM (Advection - Diffusion Modelling) is a package of FORTRAN subroutines which are designed to solve efficiently some special advecton-diffusion equations that appear often in atmospheric environments. The package attempts to exploit some salient features of these partial differential equations (as for example the fact that the influence of the advection terms on the behaviour of the solution dominates clearly over the influence of the diffusion terms). One of the drivers, subroutine ADMO1, is fully documented. It is adequatly explained how to call two other drivers, subroutine ADMO2 and subroutine ADMO3. The subroutines which are internally called by the drivers are not documented but their functions are briefly described. Three calling programs are given as examples which illustrate how the package can be used and how the subroutines which must be supplied by the user can be written.

10648 (MST-LUFT-A—72) Numerical treatment of the advection-diffusion equation. Pt. 6. Special treatment of the diffusion terms. Zlatev, Z.; Berkowicz, R.; Prahm, L.P. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Mar 1983. 39p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751368.

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A special class of partial differential equations is often used in mathematical models describing long-term transport of air pollutants. In the numerical treatment of such models it is desirable to use explicit time-integration schemes for solving the systems of ordinary differential equations arising after the discretization of the space derivatives. However, some stability restrictions on the time-stepsize are normally imposed by the numcerical algorithm used in the discretization of the second-order derivatives ("the diffusion terms"). Sometimes these restrictions are rather severe. If this is so, then a method for removing the restrictions on he time-stepsize, which are caused by the diffusion terms, will increase the efficiency of the computational process. It is shown that for the special class of partial differential equations appearing in the models for long-range transport of air pollutants the restrictions imposed by the diffusion terms can be removed. The method for removing these restrictions is implemented in a well-documented software (package ADM), which has been used for studying the long-range transport of sulphur pollutants over Europe. Some results, obtained by this software, are given to demonstrate the performance of the proposed method in the numerical treatment of the mathematical models under consideration.

10649 A search for the identity of genotoxic agents in the ambient air using the Tradescantia bioassay. Schairer, L.A.; Sautkulis, R.C.; Tempel, N.R. (Brookhaven National Lab., Upton, NY). pp 211-228 of Short-term bioassays in the analysis of complex environmental mixtures. III. Waters; Sandhu; Lewtas; Claxton; Chernoff; Nesnow (eds.). New York, NY; Plenum Publishing Corporation (1983).

For increased perspective on the state of the art of specific in vitro assays, it is important to consider the environmental impact on whole organisms by reviewing the contributions made by in vivo assays. The more classical nonmammallian in vivo systems such as Drosophila, Zea mays, and Tradescantia are characterized by well-defined genetic bases, versatility in mode of treatment, relatively low cost, short term, and/or high sensitivity to both physical (radiation) and chemical mutagens. This paper will deal exclusively with somatic mutation in the Tradescantia stamen hair, describing the system briefly, demonstrating its relevance to environmental mutagen assessment, and discussing its adaptation for in situ ambient atmosphere monitoring in polluted industrial sites.

5002 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 9280, 9282, 9285, 9288, 9294, 9413, 9616, 9765, 10468, 10473, 10633, 10680, 10703, 10928, 10929

10650 (CONF-821215—, pp 55-67) **Trapping of gaseous fluoride emissions on solid sorbents.** Windt, N.F. (Paducah Gaseous Diffusion Plant, KY). Aug 1983. NTIS, PC A24/MF A01. Contract W-7405-ENG-26.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The trapping of gaseous fluorides in enrichment industry vent streams is reviewed. A fundamental theories section briefly points out the complexities of gas-solid interactions, desirable sorbent properties, the selection process for new sorbents, and engineering design requirements. The major discussions focus on several recent improvements and new applications. These are for testing of four different uranium hexafluoride sorbents, sorbents for fluorine (F_2), chlorine trifluoride (ClF_3), and hydrogen fluoride (HF) and improved sorbents for low-level radioactive gases. The paper concludes with future studies at the three Enrichment Plants.

10651 (CONF-821215—, pp 119-134) **Quality assurance in environmental measurements.** Oakes, T.W. (Oak Ridge National Lab., TN). Aug 1983. NTIS, PC A24/MF A01. Contract W-7405-ENG-26.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The following elements of a quality-assurance (QA) program as applied to environmental surveillance activities are presented: (1) a philosophical and conceptual framework for QA, with a detailed assessment of the sources of uncertainty in a monitoring program; (2) the requirements for the formulation of general and technical procedures of quality control; (3) the environmental QA activities implemented at Oak Ridge National Laboratory (ORNL), including details on record keeping, data reduction and compilation, auditing, analytical procedures, inter-laboratory sample comparisons and data interpretation; and (4) the role management must play to ensure a successful program. The QA principles developed here may be applied to any surveillance program. 34 references.

10652 (CONF-821215—, pp 431-446) **Environmental program at the MHD Coal Fired Flow Facility.** Lynch, T.P.; Cooper, J.A.; Hansen, J.H.; Attig, R.C. (Univ. of Tennessee Space Inst., Tullahoma). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The environmental program at the University of Tennessee Space Institute (UTSI) Coal Fired Flow Facility (CFFF) integrates emissions monitoring, ambient air monitoring, water quality monitoring, and terrestrial monitoring into a program designed to follow the MHD technology from the raw coal processing to the ambient environment. After approximately a two year monitoring period the environmental effort was aimed more intensely at complementing the process gas and effluent monitoring with ambient monitoring. With baselines complete, studies are now being done to assess potential impacts of full scale MHD plants and to develop methods for controlling effluents before they reach conventional downstream pollution control devices. The trends observed thus far from monitoring the MHD gas stream and water effluent indicate high temperature, high sulfur coal combustion to be very feasible energy technology for the future. 5 references, 8 figures, 1 table.

10653 (CONF-8310240—3) FORAST: a regional scale study of forest responses to air pollutants. McLaughlin, S.B. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 12p. NTIS, PC A02/MF A01. Order Number DE84003269.

From Symposium on air pollution and the productivity of the forest; Washington, DC, USA (4 Oct 1983).

The FORAST (Forest Responses to Anthropogenic Stress) study was recently intiated to quantify long-term changes in forest growth and determine the temporal and spatial association of these changes with indices of stress from gaseous pollutants (primarily O_3) and acid rainfall. This broadly collaborative project presently involves 12 research sites utilizing a common research plan. As a part of this plan, duplicate cores are being removed from approximately 6000 forest trees represetnting 34 species and 88 forest stands and distributed over 15 eastern states. Approximately 95% of the field sampling has been completed and analysis of cores is underway. Both potentially acid sensitive and acid resistant sites are being systematically included in the sampling protocol. Multivariate statistical analysis of annual growth trends will be used to quantify primary influences on annual growth as measured from increment cores. These variables include climatic variables, oxidant pollution levels, trends in acid deposition, and site factors, including both stand density and soil chemical characteristics. This is a two-year project which focuses on development of methods to systematically examine regional growth patterns, determine if changes are occurring which are correlated with acid rainfall and associated anthropogenic stress, and identify both the need and the methodology for further more intensive analyses. 7 references, 3 figures, 2 tables.

10654 (DOE/EV/70035—T2) Molten salt destruction of hazardous materials process and data update. Ashworth, J.A.; Johanson, J.G. (Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group). [nd]. Contract AT03-76EV70035. 19p. NTIS, PC A02/MF A01. Order Number DE83016163.

Current federal or state laws require controlled, documented practices for the management of specified materials designated as

environmentally hazardous or toxic. Compliance with disposal criteria of these laws involves meeting strigent TOSCA or RCRA emission criteria. Disposal of hazardous or toxic material by any means that does not result in conversion of the material to ecologically harmless form sets up a continuing responsibility for prevention of damage to public health and to property. A thermal conversion process or incineration is usually recommended for the more toxic organic materials. To be successful, such a process must avoid air pollution during operation and also must produce no toxic byproducts that could result in later deterioration of groundwater quality. The molten salt process is uniquely well suited to convert many toxic organic materials into nontoxic gases and ecologically harmless byproducts. This paper describes the Rockwell Molten Salt Destruction (MSD) process and provides an update, including experimental results with polychlorinated biphenyls (PCBs) and hexachlorobenzene (HCB), which demonstrates the high degree of destruction achievable with the MSD process. Results of bench-scale and pilot-scale tests are described.

10655 **(IVL-B—722) Extra high emissions of nitrogen oxides in Gothenburg 1975-1981.** Galle, B.; Grennfelt, P. (Swedish Water and Air Pollution Research Lab., Goeteborg). Mar 1983. 21p. (In Swedish). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83751385.

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Extra high emissions of nitrogen oxides in the city area of Gothenburg have been studied. The investigation covers the five-year period from 1975 to 1981 and the occasions when the emission exceeded 600 ppb which took place at 4 % of the time, mainly during the winter season. The meteorological conditions, such as soft east winds were of essential importance. When studying the ratio of SO_2/NO sub (x), it was found that the dominating source of nitrogen oxides was traffic. The ratio of NO_2/NO sub (x) showed a decreasing tendency on time scale and that the emission of NO_2 took place primarily at high concenrations.

10656 **(KHM-TR—58) Measurements of suspended particles and particle deposition. Methods and evaluation of methods.** Andersson, K.; Johansson, B.; Loevblad, G.; Steen, B. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 82p. (In Swedish). NTIS (US Sales Only), PC A05/MF A01. Order Number DE83751386.

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Seven methods for measuring total suspended particles in the atmosphere, particle flux and particle deposition are described. The methods treated are 1) measurement of total suspended particles using LIB-sampler. 2) measurement of total suspended particles using Highvolume sampler with or without cascade impactor. 3) measurement of suspended particles in two size categories using Dichtomous sampler. 4) measurement of particle flux using an isokinetic dust sampler. 5) measurement of settling particles using an horisontal deposit gauge. 6) directed measurement of settling particles using a vertical deposit gauge. 7) measurement of settling particles using depositon plates. Data on performance are obtained from the literature and by theoretical and practical judgements. The advantages and disadvantages of the methods including data on accuracy reproducibility, and the influence of parameters like wind speed, wind direction, particle size, and precipitation on the results are reported and discussed.

10657 **(KHM-TR—60) Mutagenicity in emissions from coal and oil fired boilers as detected by the salmonella/microsome assay.** Alfheim, I.; Moeller, M. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751380.

Summary in Swedish.

The mutagenicity of emission samples from 12 boilers representing various sizes, fuels and technologies have been compared using the Salmonella/microsome assay. Three of the boilers were burning oil, eight were coal fired and one was fired with a mixture of coal and oil. An additional sample was taken from one of the fluidized bed combustors while it was burning a mixture of coal, peat and woodwaste. The samples were collected under presumably optimal conditions for the various boilers. The samples from five of these boilers, two oil-fired and three coal-fired, showed no mutagenic activity, whereas samples from two additional coal fired boilers had mutagenic activity just above the detection limit. The sample from the intermediate oil fired boiler showed a mutagenic activity about 3000 reverants/MJ, whereas the samples from four of the coal fired boilers showed activities in the range from 50 to 58.000 reverants/MJ. All samples contained substances that were cytotoxic to the test bacteria, thus making it difficult to obtain linear dose-response curves. Mutagenic activity at low levels may remain undetected due to this toxocity of the samples. The most mutagenic sample was from the 5 MW fluidized bed combustor. The high activity was probably due to operational problems or to the design of this specific boiler, since the two samples from a larger fluidized bed combustor were non-mutagenic. The second most mutagenic sample was from a small plant, the 2 MW on/off boiler. It is possible that the mutagens present in this sample were formed under start out conditions after a stop, but time- resolved samples would be necessary to investigate this further. The mutagenic activities of the other samples were considerably lower than these two and would only give a minor contribution to the mutagenicity of the ambient air.

10658 **(LRAP—21) UV lidar techniques for atmospheric NO monitoring.** Edner, H.; Fredriksson, K.; Hertz, H.; Svanberg, S. (Tekniska Hoegskolan, Lund (Sweden). Fysiska Institutionen). 1983. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83751403.

Differential-absorption lidar (dial) techniques have been used for atmospheric NO monitoring. By twice Anti-Stokes shifting a frequency-doubled dye laser, employing a high pressure H_2 cell, wavelengths in the NO γ band at 227 nm were generated. Laboratory measurements of absorption cross sections were performed for quantifying field measurements performed with a mobile lidar system. Urban concentrations of NO were measured using long-path-absorption techniques, where retroreflectors were used for enhancing the backscattered light. Statistical studies of return echo amplitudes were performed in order to assess the precision attainable in dial measurements.

10659 **(MST-LUFT-A—67) Zero/span control of monitors used in the Danish national airquality measurement program.** Westerberg, B. (Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.). Feb 1983. 26p. (In Danish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751366.

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In a Danish air quality monitoring network sulphur dioxide and nitrogen oxides are continuously monitored on a mainstation in 6 urban centres. Detection of sulphur dioxide is based on the UV-fluorescence principle, nitrogen oxides detected by the chemiluminescence method. The monitors are operated unattended for a week and are not equipped with automatic zero/span devices. A detailed description of the zero/span testing procedure and a discussion of the results of 2 consecutive zero/span controls is given. The following specifications are attainable for both types of monitors; zero-point stability +- 3 ppb/2 months, span level stability +- 10%/2 months over measuring 0-0.5 ppm. The zero-point stability is subjected to random noise, however the sensitivity (span-level) of the instruments decreases over the period.

10660 **(NUREG/CR—3456) Hanford atmospheric dispersion data: 1960 through June 1967.** Nickola, P.W.; Ramsdell, J.V.; Glantz, C.S.; Kerns, R.E. (Pacific Northwest Lab., Richland, WA (USA)). Nov 1983. Contract AC06-76RL01830. 676p. (PNL—4814). NTIS, PC A99/MF A01 - GPO $12.00. Order Number DE84004655.

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This volume presents dispersion and supporting meteorological data from experiments conducted over relatively flat terrain at Hanford, Washington from January 1960 through June 1967. The nature of the experiments, the sampling grids, and the tracer techniques used are described in the narrative portion of the document. Appendices contain the time-integrated concentrations for samplers within the plumes, summaries of the concentration distributions across the plumes, and wind and temperature profile data for each release period. 18 references, 7 figures, 3 tables.

10661 **(NUREG/CR—3488-Vol.1) Idaho Field Experiment 1981. Volume 1. Experimental design and measurement systems.** Start, G.E.; Cate, J.H.; Dickson, C.R.; Sagendorf, J.F.; Ackermann, G.R. (National Oceanic and Atmospheric Administration, Idaho Falls, ID (USA). Air Resources Lab.). Oct 1983. 38p. NTIS, PC A03/MF A01 - GPO $3.75. Order Number DE84900725.

The Idaho Field Experiment is reported in three volumes and supplemented by special contractor reports. Volume I describes the design and goals of the measurement program and the measurement systems utilized during the field program. The measurement systems layouts are described as well. The 1981 Idaho Field Experiment was conducted in South East Idaho over the Upper Snake River Plain. Nine test-day case studies were measured between July 15 and 30, 1981. Eight-hour releases of SF_6 gaseous tracer were made from 46 m above ground. Tracer was sampled hourly, for 12 sequential hours, at about 100 locations within an area 24 km square. Also, a single total integrated sample, of about 30 hours duration, was collected at approximately 100 sites within an area 48 by 72 km (using 6 km spacings). Extensive tower profiles of meteorology at the release point were collected. RAWINSONDES, RABALS and PIBALS were collected at 3 to 5 sites. Horizontal, low-altitude winds were monitored using the INEL MESONET. SF_6 tracer plumes were marked with co-located oil fog releases and bi-hourly sequential launches of tetroon pairs. Aerial LIDAR observations of the oil fog plume and airborne samples of SF_6 were collected. High-altitude aerial photographs of daytime plumes were also collected. 10 references, 14 figures, 5 tables.

10662 **(PB—83-259184) Comparison of methods for measuring ambient concentrations of sulphur dioxide.** Bower, J.S.; Sullivan, E.J. (Warren Spring Lab., Stevenage (UK)). 1980. 22p. NTIS, PC AE03/MF E03.

Some continuous instrumental methods for measuring ambient concentrations of sulphur dioxide are compared with the National Survey technique. The fine time-resolution of these instrumental methods is essential for many monitoring applications, but the penalties are increased complexity, cost and unreliability. The following instruments and operating principles are examined: (1) Philips PW 9700 Analyser (Coulometric principle). (2) Wosthoff Ultragas U3S (Conductimetric principle). (3) Littlewood-Nash Analyser (Conductimetric principle). (4) Bendix 8300 and Meloy SA 160 Total Sulphur Monitors (Flame Photometric principle). All instruments were found to give results corelating well with those from the National Survey method and were, in general, found to be in close quantitative agreement. (Copyright (c) Crown Copyright 1980.)

10663 **(PB—83-259937) Air pollution from oxides of nitrogen, carbon monoxide and hydrocarbons.** Apling, A.J.; Potter, C.J.; Williams, M.L. (Warren Spring Lab., Stevenage (UK)). [nd]. 38p. NTIS, PC AE04/MF E04.

The contributions of mobile and stationary sources to the atmospheric burden of nitrogen oxides, carbon monoxide and total hydrocarbons are reviewed. The main sources of nitrogen oxide emissions are power stations, motor vehicles and commercial and industrial operations; carbon monoxide emissions arise mainly from motor vehicle exhaust and hydrocarbon emissions come mainly from motor vehicles and stationary non-combustion sources. Measurements of ambient concentrations of these and other pollutants indicate that stationary sources make a significant contribution to kerbside nitric oxide and total hydrocarbon concentrations. Over the period 1972 to 1977 there have been no significant trends detectable in ambient concentrations of the pollutants considered in this report. (Copyright (c) Crown Copyright 1979.)

10664 **(PB—83-260216) National survey of smoke and sulphur dioxide - quality control tests on the analysis of samples.** Weatherly, M-L.; Appleton, J.; Charnock, J.; Coates, J. (Warren Spring Lab., Stevenage (UK)). [nd]. 31p. NTIS, PC AE04/MF E03.

Tests to access the accuracy with which National Survey operators analyse samples of smoke and sulphur dioxide they have collected from the atmosphere were made by the Warren Spring Laboratory, which co-ordinates the Survey, between October 1975 and February 1977. Some 130 of the 350 or so co-operating bodies were involved. The results suggest that mean errors due to analysis are negligible, although errors in a few individual smoke or sulphur dioxide determinations can be unacceptably large. (Copyright (c) Crown Copyright 1979.)

10665 **(PB—83-261438) Odour control by thermal incineration.** Carleton, A.J. (Warren Spring Lab., Stevenage (UK)). [nd]. 47p. NTIS, PC AE04/MF E04.

This report describes desirable design features of thermal incinerators used for odor control. Possible problems and limitations on performance arising from poor design, maintenance or operation of the incinerator or ancillary equipment are discussed. Methods of economizing on heat are described and examples are given to show the operating conditions needed for satisfactory performance at minimum cost. This report is one of a series summarizing the work of a three year research programm on odor measurement and abatement carried out at Warren Spring Laboratory. (Copyright (c) Crown Copyright 1978.)

10666 **(PB—83-262113) Numerical diffusivity model and its application to fumigation processes.** Spanton, A.M.; Williams, M.L. (Warren Spring Lab., Stevenage (UK)). [nd]. 29p. NTIS, PC AE04/MF E04.

An implicit finite difference scheme is used to integrate numerically the diffusion equation for an infinite line source. The results are compared with the analytical solution and the sensitivity of the model to some of the parameters is investigated. The model is then used to calculate concentrations during an idealized fumigation episode and also during two periods of elevated pollution in Central Scotland when the results are compared with measured SO2 data. (Copyright (c) Crown Copyright 1982.)

10667 **(PB—83-262279) Determination of in-service vehicle gaseous emissions over a wide range of road operating conditions.** Potter, C.J.; Savage, C.A. (Warren Spring Lab., Stevenage (UK)). [nd]. 98p. NTIS, PC AE06/MF E06.

Using the WSL vehicle exhaust gas proportional sampler the emissions of carbon monoxide, total hydrocarbons and nitrogen oxides have been determined from four vehicles of engine capacity 1, 1.6 and 2 litres; manual and automatic versions of the latter were tested. The data indicate that the ECE drive is a reasonable simulation of typical urban drives and consequent gaseous emissions. Steady-state drive data have been obtained for speeds from 10-113 kph. Some of the highest emission rates occurred during rapid accelerations from rest and decelerations from 110 kph. (Copyright (c) Crown Copyright 1982.)

10668 **(PB—83-263400) Further experiments on a model of an escape of heavy gas.** Hall, D.J. (Warren Spring Lab., Stevenage (UK)). [nd]. 47p. NTIS, PC AE04/MF E04.

The report is concerned with predicting the scale and behaviour of escapes of heavy (ie denser than air) gases, in particular the flammable gases propane and butane, by using wind tunnel modelling. It considerably extends the scope of some earlier work on the same subject. The problems of model scaling are considered further and the range of the measurements is extended to give a much wider coverage of full-scale conditions. The characteristics of the dense gas plume have been examined in more detail. Considerable attention has been paid to the behaviour of short-term as distinct from continuous releases as these are representative of many likely full-scale escapes. (Copyright (c) Crown Copyright 1979.)

10669 **(PB—83-264457) Chemistry and visual impact of the plumes from the Four Corners Power Plant and San Manuel Copper smelter. Interim report 4 Apr 79-14 Jan 82.** Zwicker, J.O.; Macias, E.S.; Anderson, J.A.; Hering, S.V.; Ouimette, J.R. (Washington Univ., St. Louis, MO (USA)). Sep 1983. 67p. NTIS, PC A04/MF A01.

This paper presents a study of the conversion of SO2 to particulate sulfur in a Western power plant plume and in a Western copper smelter plume, the impact of these plumes on visibility, and the relative contributions of primary and secondary aerosols to this impact. In the Four Corners region most of the particulate sulfur was in the form of ammonium sulfate during the sampling period.

The data suggest that most but not all of the particulate sulfur in the San Manuel plume and background was in the form of sulfate.

10670 **(PB—83-264465) Guidelines for monitoring indoor air quality. Research report.** Nagda, N.L.; Rector, H.E. (Geomet Technologies, Inc., Gaithersburg, MD (USA)). Sep 1983. 256p. NTIS, PC A12/MF A01.

This document provides guidelines for designing programs to measure indoor air quality and associated factors. Brief summaries of past and current research and descriptions of indoor contaminants provide a background for developing the monitoring design. Factors that influence indoor air quality are discussed with the aid of mass balance models. An extensive review of measurement systems, including a listing of numerous instruments with their performance specifications, is presented. Design considerations are discussed for two types of studies–applied research in indoor air quality and investigations of building-associated problems. A systematic approach for developing the design is also described. In addition, the document presents a format for data reporting and suggestions on quality assurance and quality control.

10671 **The flux of sulfur-containing gases to vegetation.** Taylor, G.E. Jr.; McLaughlin, S.B. Jr.; Shriner, D.S.; Selvidge, W.J. (Oak Ridge National Lab., TN). *Atmospheric Environment;* **17**: No. 4, 789-796(1983). Contract W-7405-ENG-26.

The flux of five sulfur gases to vegetation exposed to each gas individually at an ambient concentration of 0.12 $\mu l\ l^{-1}$ (5 $\mu moles\ m^{-3}$) was assessed using a whole-plant, gaseous exchange system. Total leaf flux of each gas was partitioned into leaf surface (adsorption) and internal (absorption) fractions. Internal flux varied four to sevenfold among gases, and the magnitude of flux was in the following order: sulfur dioxide > hydrogen sulfide > carbonyl sulfide > methyl mercaptan > carbon disulfide. The regression of internal flux on water solubility and molecular size accounted for 73 and 87% of the variation in Glycine max and Phaseolus vulgaris, respectively. Leaf conductance, which was adjusted for each gas based on their respective diffusivities in air, did not improve the regression significantly. Estimates of internal flux based on the product of leaf conductance and ambient concentration may not be an accurate technique to assess the rate of absorption for all pollutant gases into the leaf interior under daylight conditions. For highly soluble and chemically reactive gases such as SO_2, the latter technique tends to underestimate flux by 50%, which may result from a mean SO_2 diffusive path length that is less than that for water vapor. The relationship between flux and the physicochemical properties of a gas may provide a technique for screening atmospheric emissions for their potential toxicity to vegetation.

10672 **Atmospheric dispersion of ammonia: an ammonia fog model.** Kansa, E.J.; Ermak, D.L. (Lawrence Livermore National Laboratory, University of California, Livermore, CA). *AIChE (American Institute of Chemical Engineers) Symposium Series;* **79**: No. 225, 390-399(1983). Contract W-7405-ENG-48.

Ammonia (NH_3), a by-product of many chemical processes, is widely used as a fertilizer and as a raw material for many chemical syntheses. The purpose of this paper is to discuss the atmospheric dispersion of ammonia resulting from a high pressure release. The resulting nature of the two-phase cloud of ammonia vapor and droplets has a significant effect on its dispersion characteristics. Our calculations of a 40 ton release show that even under moderately high wind conditions, the resulting ammonia cloud remains negatively buoyant for considerable distances downwind.

10673 **Comparison of observed and predicted normalized air concentrations for particles released from a height of 111 meters.** Miller, C.W.; Cotter, S.J. (Oak Ridge National Lab., TN). pp 271-274 of 3rd joint conference on applications of air pollution meteorology. Boston, MA; American Meteorological Society (1982). (CONF-820101—). Contract W-7405-ENG-26.

From 3. joint conference on applications of air pollution meteorology; San Antonio, TX, USA (11 Jan 1982).

A volume of data documenting short-term (≦ 30 minutes) atmospheric dispersion experiments carried out at Hanford, Washington, under thermally stable conditions is available (Nickola, 1977). These data provide a source of information for validation of the Gaussian plume model, the atmospheric dispersion model most commonly used in radiological assessments. The purpose of this paper is to compare normalized crosswind-integrated ground-level air concentration measurements of zinc sulfide fluorescent particles released from a height of 111 m with predicted values made by a Gaussian plume atmospheric dispersion model. In general the results of this study highlight the difficulty of specifying a set of dispersion parameters and estimating atmospheric stability for use in assessment activities. These results also show that such specification is important in determining the accuracy of Gaussian plume atmospheric dispersion model predictions.

10674 **Regional air quality in the Four Corners Study Region: modeling approach.** Nochumson, D. (Los Alamos National Lab., NM). pp 208-212 of 3rd joint conference on applications of air pollution meteorology. Boston, MA; American Meteorological Society (1982). (CONF-820101—).

From 3. joint conference on applications of air pollution meteorology; San Antonio, TX, USA (11 Jan 1982).

A two-dimensional Eulerian air pollutant transport model was used in an air quality study of the Four Corners region conducted for the National Commission on Air Quality. The regional modeling methodology and some sample results from the regional air quality analysis are presented in this paper. One major advantage of the regional transport model that was employed is that its solution involves the calculation of transfer coefficients that relate emissions to ambient concentrations and deposition and which can be used repeatedly to evaluate alternative scenarios and regulatory policies which represent different emission source configurations. The regional transport model was used in the calculation of the concentration and deposition of SO_2, SO_4, and FPM and these estimates were used as inputs to regional atmospheric visibility and mass budget calculations.

10675 **Air infiltration measurements in a home using a convenient perfluorocarbon tracer technique.** Dietz, R.N.; Cote, E.A. (Brookhaven National Lab., Upton, NY). *Environment International;* **8**: 419-433(1982). Contract AC02-76CH00016.

Using miniature perfluorocarbon tracer (PFT) sources and miniature passive samplers, both about the size of a cigarette, tests conducted in the laboratory and in a typical home successfully demonstrated the utility of the PFT kit as a means for implementing wide-scale infiltration measurements in homes. A liquid PFT permeation source was used with emission rates which could be tailored over the range 10-20 nL/min, were independent of age for as long as the liquid remained (~5 yr), and had significantly lower temperature dependence than the PFT diffusion plug source. Together with a programmable tracer sampler, the miniature diffusion sources and samplers were deployed in a typical home and analysis was performed with an automatic electron-capture gas-chromatography system. The effects of the inside/outside temperature differential, as well as that of an open fireplace compared with a wood-burning stove, on the measured air infiltration rates were clearly demonstrated. Comparisons of the PFT tracer method with that of SF_6 tracer decay approach showed the results of the two methods to be identical within experimental precision.

10676 **Pine needles as sensors of atmospheric pollution.** Harbottle, G.; Miller, R.; Sayre, E.V. (Brookhaven National Lab., Upton, NY). *Environmental Monitoring and Assessment;* **2**: 273-286(1982).

Neutron Activation Analysis of pine needles from trees growing in areas of relatively high and low airborne pollution has been performed. Needles of three different species, and from several sequential year's crops, have been studied. The purpose of the study was to determine the type of distribution governing the elemental concentrations, the inter- and intrasite differences, and the degree of dependence on soil vs airborne elemental sources. A log normal distribution was found for those elements considered to be well determined. The results indicate that pine needles can be used as an air pollution monitor provided that sufficient sampling is done to compensate for natural variation in elemental concentrations.

10677 The effects of ventilation on residential air pollution due to emissions from a gas-fired range. Traynor, G.W.; Apte, M.G.; Dillworth, J.F.; Hollowell, C.D.; Sterling, E.M. (Univ. of California, Berkeley). *Environment International;* 8: 447-452(1982). Contract AC03-76SF00098.

The use of indoor combustion appliances can cause an increase in the levels of many different pollutants. The work presented here shows the usefulness of a model for extrapolating environmental chamber results on pollutant emissions from combustion appliances to determine indoor pollutant concentrations in actual residences. In addition, the effects of infiltration, whole-house ventilation, and spot ventilation on pollutant levels are investigated. The results show that a range hood is the most effective means of removing pollutants emitted from a gas-fired range; removal rates varied from 60% to 87%.

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REFER ALSO TO CITATION(S) 9465, 9859, 10710, 10951

10678 (AAEC/E—563) Environmental survey at the Lucas Heights Research Laboratories, 1981. Williams, A.R.; Dudaitis, A. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Mar 1983. 37p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704118.

This survey of environmental conditions in the neighbourhood of the Lucas Heights Research Laboratories during 1981 indicates no significant radiological hazard to the general public. This result is consistent with the fact that controlled airborne and liquid effluent releases throughout the year were maintained within the authorised limits, and also indicates that there were no significant accidental releases. Residual cobalt-60 and zinc-65 activity in the Woronora River has decreased since the cessation of controlled liquid effluent discharges in 1980. No trends are obvious, in any of the data, which could lead to future problems from continued operation on the present scale.

10679 (CEA-R—5228) Interactive computer model for the assessment of continuous release atmospheric transfers. Pages, P.; Rancillac, F. (CEA Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France)). May 1983. 54p. (In French). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84750260.

The purpose of the model is to assess air concentrations and soil deposits following a continuous release of gaseous effluents. This is usually part of the problem of assessing the consequences of normal operation of a plant. The atmospheric dispersion model used is the gaussian plume model according to DOURY's scheme. Ground reflexion, the presence of an inversion layer and removal processes (by dry or wet deposition and radioactive decay type) are taken into account. Air and ground concentrations are computed around the release point according to an arbitrary grid with spatial coordinates and accounting for annual frequencies of meteorological conditions. The methodology is presented in detail and assumptions are clearly stated. A conversational structured computer program has been set up in APL which allows to get results easily and to test their sensitivity to various assumptions concerning both input data and model parameters. As an example an application of the model with real data and results is given.

10680 (CONF-821215—) Fourth DOE environmental protection information meeting. Proceedings. (USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety). Aug 1983. 560p. NTIS, PC A24/MF A01. Order Number DE83017117.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

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Separate abstracts were prepared for the 51 papers included in this proceedings volume for the Energy Data Base (EDB). All are included in Energy Research Abstracts (ERA); eight are included in Energy Abstracts for Policy Analysis (EAPA). (ACR)

10681 (CONF-821215—, pp 227-236) Nuclear air cleaning: the need for a change in emphasis. Carbaugh, E.H. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01. Contract AC06-76RL01830.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The nuclear industry now has over 35 years of experience in nuclear air cleaning. This experience covers technology development, system design, operations, and maintenance. Much of the past experience has been directed towards technology development with particular emphasis on high efficiency particulate air (HEPA) filters. Implementation of this technology has lagged its development by a number of years. A recent study examines the causes and frequencies of HEPA filter changeouts and failures. These data lead to a conclusion that a shift in emphasis from technology development to the training of personnel and the designing and maintaining of such systems is needed. Some highlights of the data and a discussion of topics which should be addressed in training will be presented. 7 references, 5 tables.

10682 (CONF-821215—, pp 279-290) Some problems in evaluating radiation dose for effective environmental assessment. Watson, E.C.; Vaughan, B.E.; Soldat, J.K.; Schreckhise, R.G.; McKenzie, D.H. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

This review is concerned with radiation dose assessment methods and their accuracy. Although the models used in radiation dose assessment are inherently capable of better absolute accuracy, in practice, a calculated dose is usually overestimated by from two to six orders of magnitude. The principal reason for so large an error lies in using generic concentration ratios in situations where site specific data are needed. Major opinion of the model makers suggests a number midway between these extremes, with only a small likelihood of ever underestimating the radiation dose. Factors influencing dose include: source considerations (i.e., physical and chemical status of released material); dispersal mechanisms (atmospheric, hydrologic and biotic vector transport); mobilization and uptake mechanisms (i.e., chemical and other characteristics affecting the biological availability of radioelements); and critical pathways. Examples are shown of confounding in food-chain pathways, due to indiscriminate application of concentration ratios. The pathways models may also require improved parametrization, as they are not at present structured adequately to lend themselves to validation. The extremely wide errors associated with predicting exposure stand in striking contrast to the error range associated with the extrapolation of animal effects data to the human being. 38 references, 1 figure.

10683 (DPST—82-1054) Savannah River Plant airborne emissions and controls. Dukes, E.K.; Benjamin, R.W. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.). Dec 1982. Contract AC09-76SR00001. 59p. NTIS, PC A04/MF A01. Order Number DE84005274.

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The Savannah River Plant (SRP) was established to produce special nuclear materials, principally plutonium and tritium, for national defense needs. Major operating facilities include three nuclear reactors, two chemical separations plants, a fuel and target fabrication plant, and a heavy-water rework plant. An extensive environmental surveillance program has been maintained continuously since 1951 (before SRP startup) to determine the concentrations of radionuclides in a 1200-square-mile area centered on the plant, and the radiation exposure of the population resulting from SRP operations. This report provides data on SRP emissions, controls systems, and airborne radioactive releases. The report includes descriptions of current measurement technology. 10 references, 14 figures, 9 tables.

10684 (EGG—10282-1021) Aerial radiological survey of the Three Mile Island Nuclear Station and surrounding area, Middletown, Pennsylvania. Colton, D.P. (EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group). Aug 1983. Contract AC08-83NV10282. 22p. NTIS, PC A02/MF A01. Order Number DE84005015.

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An aerial radiological survey was performed over the area surrounding the Three Mile Island Nuclear Station during October 26 to 30, 1982. The survey covered an 82-square-kilometer area centered on the nuclear plant and encompassed the communities of Middletown, York Haven, Goldsboro and Royalton, Pennsylvania. The highest radiation exposure rates, up to a maximum of 200 microroentgens per hour (μR/h), were inferred from data measured directly over the TMI facilities. This detected radiation was due to the presence of cobalt-58, cobalt-60 and cesium-137, which was consistent with normal plant operations. Similar activity is routinely observed in aerial surveys over nuclear power plants which have been or are presently in an operational mode. For the remainder of the survey area, the inferred radiation exposure rates varied from 6 to 14 μR/h. The reported exposure rate values include an estimated cosmic ray contribution of 3.7 μR/h. Ground-based measurements, conducted during the time of the aerial survey, were compared to the aerial results. Pressurized ionization chamber readings and a group of soil samples were acquired at several locations within the survey area, along the river banks upstream and downstream of the survey area, and at the ground-based locations used for a previous aerial survey which was conducted in 1976. The exposure rate values obtained from these measurements were in agreement with the corresponding aerial data. With the exception of the activity observed within the TMI facilities, no evidence of any contamination which might have occurred as a result of past reactor operations or the 1979 TMI Unit 2 accident was detected from the aerial survey data. This was further supported by the results of the soil sample analyses and the comparison with the 1976 aerial survey data. 7 references, 12 figures, 4 tables.

10685 **(EGG—10282-1024) Aerial radiological survey of the Brunswick Steam Electric Plant and surrounding area, Southport, North Carolina. Date of survey: March 1980.** Maguire, T.C.; Shipman, G.R. (EG and G, Inc., Las Vegas, NV (USA). Remote Sensing Lab.). Sep 1983. Contract AC08-83NV10282. 13p. NTIS, PC A02/MF A01. Order Number DE84005018.

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An aerial radiological survey was conducted from 15 to 20 March 1980 over the two-unit Brunswick Steam Electric Plant near Southport, North Carolina. The survey covered a 170-square-kilometer area centered on the plant. Radiological data were collected by flying along north-south lines spaced 152 meters (500 feet) apart at an altitude of 91 meters (300 feet) above ground level. Count rates obtained from the aerial platform were converted to exposure rates at 1 meter above the ground. Exposure rates over most of the area ranged between 5 and 9 microroentgens per hour (μR/h). Elevated exposure rates, up to 24 μR/h, were detected over the plant site due to the presence of cobalt-58 and cobalt-60. The reported exposure rate values include an estimated cosmic ray contribution of 4 μR/h but not not include any contribution from airborne radionuclides. Airborne krypton-85 was detected in a plume when flying flight lines in the immediate vicinity downwind of the plant. The maximum concentration of airborne krypton-85 detected was approximately 200 picocuries per liter. Ground-based measurements made during the same time period were compared to the aerial data. Ion chamber readings and soil samples were taken at five separate locations within the survey area. Exposure rate values obtained from these measurements were consistent with those obtained from the aerial data. 4 references, 7 figures, 1 table.

10686 **(IAEA-TECDOC—279) Regional and global environmental behaviour of radionuclides from the nuclear fuel cycle. Report of the advisory group meeting on pathways for radionuclide releases of regional and world-wide interest organized by the IAEA held in Vienna, 2-5 June 1981.** (International Atomic Energy Agency, Vienna (Austria)). Feb 1983. 71p. (CONF-8106308—). NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704119.

From Advisory group meeting on pathways for radionuclide releases of regional and world-wide interest; Vienna, Austria (2 Jun 1981).

The operation of nuclear fuel cycle facilities entails the discharge of radioactive effluents to both the atmosphere and aquatic environment. These effluents may contain radionuclides which may be subject of concern for their long-range environmental consequences, in particular, in assessing the health detriment to populations in regions beyond the local environment. The present document reviews information on radionuclides, their environmental pathways and processes and related models and summarizes experiences and studies in this field.

10687 (INIS-mf—8572, pp 5-66) **Determination of very small activities of radioiodine and plutonium in air.** Irlweck, K.; Karg, V.; Schoenfeld, T.; Sorantin, H.; Steger, F. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H. Inst. fuer Strahlenschutz). 1982. (In German). NTIS (US Sales Only), PC A16/MF A01.

In Environmental radioactivity. Contributions to environment protection, provision affairs, veterinary administration.

A mobile high volume sampler with the following characteristics was developed: air flow rate 5000 $m^3.h^{-1}$, total cross section of the seven activated charcoal filter units 0.6 m^2, diameter of each filter unit 33 cm, thickness of charcoal layer 4 - 7 cm. The sorbed radioiodine is eluted from the charcoal in a circulation unit by a circulating solution (sodium hydroxide/hydrazine) and is transfered into a sorbent containing silver (ion exchange resin with colloidal silver), thereby bringing about a reduction in volume by a factor of approximately 1000. The radioiodine activity is then determined by gamma spectrometric measurement of the silver containing sorbent. The overall radioiodine yield measured with ^{123}I spike (sorption on charcoal and transfer to the silver containing sorbent) is 75 (+-7)%. A detection limit of 0.02 $mBq.m^{-3}$ is achieved for ^{131}I. If the sampler is operated with the standard throughput of 5000 $m^3.h^{-1}$, this limit applies to one hour average concentration values. Results of environmental monitorings for the period 1979 - 1982 at the Research Center Seibersdorf for ^{131}I (up to 2,6 mBq/m^3) and for plutonium (up to 4 $\mu Bq/m^3$) are given.

10688 **(INIS-mf—8572) Environmental radioactivity. Contributions to environment protection, provision affairs, veterinary administration.** (Bundesministerium fuer Gesundheit und Umweltschutz, Vienna (Austria)). 1982. vp. (In German). NTIS (US Sales Only), PC A16/MF A01. Order Number DE84780047.

Items within the scope of EDB have been entered individually into the data base. (ACR)

10689 (INIS-mf—8642, pp 47) **Gamma source concentration in atmosphere.** Beseova, G.; Chudy, M.; Pisutova, N.; Povinec, P. (Komenskeho Univ., Bratislava (Czechoslovakia)). May 1983. (In Slovak). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10690 **(LUTFD2/TFKF—3038/1-29(1983)) Radon measurements indoors. An evaluation of performed measurements.** Joensson, G. (Tekniska Hoegskolan, Lund (Sweden). Fysiska Institutionen). Feb 1983. 29p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704544.

Measurements of Radon concentrations have been made using photographic film detectors in the communities of Uppsala, Soedertaelje and Tyresoe. The result from 6700 film exposures in both one-family and apartment houses are reported. The fraction of dwellings with radon daughter concentrations exceeding 200 Bq/m^3 is between 3 and 14 percent for one-family houses and 0 to 5 percent for apartment buildings. 8 to 68 percent of the one-family houses and 57 to 83 percent of the apartment buildings had concentrations lower than 70 Bq/m^3. The seasonal variations were recorded in one-family houses in Uppsala. In houses with low concentrations, the winter values were higher than the summer values. For houses with high concentrations the reversed variation was recorded.

10691 (NUREG/CR—3332) Radiological assessment. A textbook on environmental dose analysis. Till, J.E.; Meyer, H.R. (eds.). (Oak Ridge National Lab., TN (USA)). Sep 1983. Contract W-7405-ENG-26. 882p. (ORNL—5968). NTIS, PC A99/MF A01 - GPO $16.00. Order Number DE84004807.

Portions are illegible in microfiche products.

Radiological assessment is the quantitative process of estimating the consequences to humans resulting from the release of radionuclides to the biosphere. It is a multidisciplinary subject requiring the expertise of a number of individuals in order to predict source terms, describe environmental transport, calculate internal and external dose, and extrapolate dose to health effects. Up to this time there has been available no comprehensive book describing, on a uniform and comprehensive level, the techniques and models used in radiological assessment. Radiological Assessment is based on material presented at the 1980 Health Physics Society Summer School held in Seattle, Washington. The material has been expanded and edited to make it comprehensive in scope and useful as a text. Topics covered include (1) source terms for nuclear facilities and Medical and Industrial sites; (2) transport of radionuclides in the atmosphere; (3) transport of radionuclides in surface waters; (4) transport of radionuclides in groundwater; (5) terrestrial and aquatic food chain pathways; (6) reference man; a system for internal dose calculations; (7) internal dosimetry; (8) external dosimetry; (9) models for special-case radionuclides; (10) calculation of health effects in irradiated populations; (11) evaluation of uncertainties in environmental radiological assessment models; (12) regulatory standards for environmental releases of radionuclides; (13) development of computer codes for radiological assessment; and (14) assessment of accidental releases of radionuclides.

10692 (PNL—4958) Master schedule for CY-1984 Hanford environmental surveillance routine sampling program. Blumer, P.J.; Price, K.R.; Eddy, P.A.; Carlile, J.M.V. (Pacific Northwest Lab., Richland, WA (USA)). Dec 1983. Contract AC06-76RL01830. 51p. NTIS, PC A04/MF A01. Order Number DE84005229.

This report provides the current schedule of data collection for the routine Hanford environmental surveillance and groundwater Monitoring Programs at the Hanford Site. The purpose is to evaluate and report the levels of radioactive and nonradioactive pollutants in the Hanford environs. The routine sampling schedule provided herein does not include samples that are planned to be collected during FY-1984 in support of special studies, special contractor support programs, or for quality control purposes.

10693 (SSI-A—82-25) Survey of indoor radon concentrations in Sweden. Buren, A.; Mjoenes, L.; Wennberg, P. (Statens Straalskyddsinstitut, Stockholm (Sweden)). 17 Dec 1982. 31p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704556.

The average value for family houses is calculated to be 121 Bq/m^3, and 87 Bq/m^3 for flats in apartment houses. Demographic statistics render an average value per person of 105 Bq/m^3. Radon has been measured in small houses built 1978 to 1980 and their average value was found to be 59 Bq/m^3. The values are presented for radon which permits calculating radon daughters.

10694 (SSI-A—83-01) Measuring stations for gamma radiation - measured results 1982. Kjelle, P.E. (Statens Straalskyddsinstitut, Stockholm (Sweden)). 14 Jan 1983. 20p. (In Swedish, English). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704545.

Gamma radiation is recorded continuously at 25 stations in Sweden. The evaluation of the data from five of the stations is made in a most accurate way, and the results are presented in this report.

10695 Comparison of theoretical predictions and measured radon and radon daughter concentrations: toward validation of the UDAD code. Momeni, M.H.; Zielen, A.J. (Argonne National Lab., IL). pp 291-297 of 3rd joint conference on applications of air pollution meteorology. Boston, MA; American Meteorological Society (1982). (CONF-820101—).

From 3. joint conference on applications of air pollution meteorology; San Antonio, TX, USA (11 Jan 1982).

The Uranium Dispersion and Dosimetry (UDAD) Code (Momeni, Yuan, and Zielen 1979) was developed to facilitate the prediction of potential radiation doses to individuals and populations in the vicinity of uranium processing facilities. The first step in these predictions is calculation of the airborne concentrations of radionuclides released during a routine industrial operation. In spite of efforts to provide flexibility for incorporating site-specific input values, the UDAD code prediction of airborne concentrations is subject to both theoretical and analytical uncertainties.

5006 Regulations

REFER ALSO TO CITATION(S) 9288, 9991, 10664

10696 (NP—4770103) Clean air program for the Rhine-Main area. (Hessischer Minister fuer Landesentwicklung, Umwelt, Landwirtschaft und Forsten, Wiesbaden (Germany, F.R.)). Apr 1981. 273p. (In German). NTIS (US Sales Only), PC A12/MF A01. Order Number DE84770103.

Portions are illegible in microfiche products.

To carry through measures for keeping the air clean systematically in all sectors it is indispensable to make a full inventory of existing emissions and nuisances, as well as of the meteorological, orographical and climatic conditions given. A register is made up and studies on the effects as well as an analysis of the causes are carried through to establish the concrete causes of air pollution. On this basis a catalogue of measures in all sectors is worked out. Besides the industrial sector the measures are also aimed at reducing pollution through domestic heating, small business and transport.

10697 (PB—83-258335) Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 1. Final report. Manuel, E.H. Jr; Horst, R.L. Jr; Brennan, K.M. (Mathtech, Inc., Princeton, NJ (USA)). Aug 1982. 121p. NTIS, PC A06/MF A01.

This study was initiated by EPA's Office of Air Quality Planning and Standards as part of its review of the current secondary standards for sulfur dioxide (SO2) and total suspended particulates (TSP). The study has drawn heavily upon new data and research advances from the past decade or so, and considerably expands the information available about the economic benefits of selected air pollution control regulations. The theoretical base for the analysis is a series of models structured to simulate optimizing behavior by members of society in markets where air quality has an influence. Groups of these members of society are referred to as 'economic sectors.' The four sectors analyzed in this study are: (1)Household, (2)Agricultural, (3)Manufacturing, and (4)Electric utilities.

10698 (PB—83-258343) Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 2. Final report. Manuel, E.H. Jr; Brennan, K.M.; Horst, R.L. Jr. (Mathtech, Inc., Princeton, NJ (USA)). Aug 1982. 300p. NTIS, PC A13/MF A01.

This study was initiated by EPA's Office of Air Quality Planning and Standards as part of its review of the current secondary standards for sulfur dioxide (SO_2) and total suspended particulates (TSP). The study has drawn heavily upon new data and research advances from the past decade or so, and considerably expands the information available about the economic benefits of selected air pollution control regulations. The theoretical base for the analysis is a series of models structured to simulate optimizing behavior by members of society in markets where air quality has an influence. Groups of these members of society are referred to as 'economic sectors.' The four sectors analyzed in this study are: (1)Household, (2)Agricultural, (3)Manufacturing, and (4)Electric utilities. This document is on the benefit analysis of households.

10699 **(PB—83-258368) Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 4. Final report.** Manuel, E.H. Jr; Brennan, K.M.; Horst, R.L. Jr. (Mathtech, Inc., Princeton, NJ (USA)). Aug 1982. 148p. NTIS, PC A07/MF A01.

This study was initiated by EPA's Office of Air Quality Planning and Standards as part of its review of the current secondary standards for sulfur dioxide (SO2) and total suspended particulates (TSP). The study has drawn heavily upon new data and research advances from the past decade or so, and considerably expands the information available about the economic benefits of selected air pollution control regulations. The theoretical base for the analysis is a series of models structured to simulate optimizing behavior by members of society in markets where air quality has an influence. Groups of these members of society are referred to as 'economic sectors.' The four sectors analyzed in this study are: (1)Household, (2)Agricultural, (3)Manufacturing, and (4)Electric utilities. This document pertains to farm crops and agricultural sector.

10700 **(PB—83-258376) Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 5. Final report.** Manuel, E.H. Jr; Brennan, K.M.; Horst, R.L. Jr. (Mathtech, Inc., Princeton, NJ (USA)). Aug 1982. 79p. NTIS, PC A05/MF A01.

This study was initiated by EPA's Office of Air Quality Planning and Standards as part of its review of the current secondary standards for sulfur dioxide (SO2) and total suspended particulates (TSP). The study has drawn heavily upon new data and research advances from the past decade or so, and considerably expands the information available about the economic benefits of selected air pollution control regulations. The theoretical base for the analysis is a series of models structured to simulate optimizing behavior by members of society in markets where air quality has an influence. Groups of these members of society are referred to as 'economic sectors.' This document discusses a limited extrapolation of the results of the basic analysis.

10701 **(PB—83-258384) Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 6. Final report.** Manuel, E.H. Jr; Brennan, K.M.; Horst, R.L. Jr. (Mathtech, Inc., Princeton, NJ (USA)). Aug 1982. 126p. NTIS, PC A07/MF A01.

This study was initiated by EPA's Office of Air Quality Planning and Standards as part of its review of the current secondary standards for sulfur dioxide (SO2) and total suspended particulates (TSP). The study has drawn heavily upon new data and research advances from the past decade or so, and considerably expands the information available about the economic benefits of selected air pollution control regulations. The theoretical base for the analysis is a series of models structured to simulate optimizing behavior by members of society in markets where air quality has an influence. Groups of these members of society are referred to as 'economic sectors.' The four sectors analyzed in this study are: (1) Household, (2) Agricultural, (3) Manufacturing, and (4) Electric utilities.

51 ENVIRONMENTAL SCIENCES, TERRESTRIAL

10702 **(PB—83-257063) Noise attenuating properties of earmuffs worn by miners. Volume 1. Comparison of earmuff attenuation as measured by psychophysical and physical methods. Open file report (final) Jan-Oct 1979.** Stewart, K.C.; Burgi, E.J. (Pittsburgh Univ., PA (USA). Graduate School of Public Health). Jan 1980. 47p. NTIS, PC A03/MF A01.

The contract was directed toward a study of the attenuating properties of earmuffs as worn by miners. Two attenuation measurement procedures were utilized. Human subjects were tested in a diffuse sound field according to threshold shift procedures recommended by the American National Standards Institute and a physical measurement procedure was accomplished in the same diffuse field on the same subjects with microphones placed simultaneously on the inside and outside of the muffs. All measurements were obtained in 1/3 octave of random noise. The results indicated that physical and psychophysical attenuation measurements are in essential agreement at frequencies from 125 Hz to kHz. Above 2 kHz the psychophysical measurement demonstrates larger amounts of attenuation than the physical measurement. The difference in attenuation ranged from approximately 7.0 to 9.0 dB at frequencies of 4 kHz and above. A possible explanation for the observed differences in attenuation has been presented.

5101 Basic Studies

REFER ALSO TO CITATION(S) 9615, 10002

10703 **(CONF-8303114—1) Integrating forest-stand simulations with paleoecological records to examine long-term forest dynamics.** Solomon, A.M.; Shugart, H.H. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 31p. NTIS, PC A03/MF A01. Order Number DE84003409.

From European Science Foundation workshop on dynamics of forest ecosystems; Uppsala, Sweden (21 Mar 1983).

Computer models permit us to study the future dynamics of present-day forests. Before applying a simulation model to predict long-term behavior of a forest, the model output should be tested against appropriate forest data. A forest-stand simulation model (FORET) and one of its variants (FORWET) have been tested with time-parallel simulations in which climate variance was inferred directly from pollen chronologies (internal consistency) and from such independent sources as other pollen chronologies, regional periglacial geomorphology, and global climate model output (authenticity). Comparison of simulation output translated into inferred pollen, with actual pollen chronologies, confirmed the reliability and adequacy of the model for certain predictive tasks, e.g., estimating response of forest biomass storage to expected CO_2-induced warming. 82 references, 5 figures, 3 tables.

10704 **Modified soxhlet extractor for pedologic studies.** Sobek, A.A.; Bambenek, M.A.; Meyer, D. (Argonne National Lab., IL). *Soil Science Society of America Journal;* **46**: No. 6, 1340-1342(Nov 1982). Contract W-31-109-ENG-38.

The soxhlet apparatus has been used in the laboratory to stimulate geochemical weathering; however, the high extraction temperatures required in the soxhlet do not represent a realistic simulation of the weathering environment. A modified design of the original soxhlet did not eliminate the problems of extraction temperature or inaccurate volumes of solvent passing through the sample. These problems were solved by moving the extraction chamber away from the upward path of the refluxing solvent. Extraction temperature differences (approximately 52°C) were responsible for higher concentrations of leachate metal in the original soxhlet leachate when a minesoil sample was weathered. This modification permits exact volumes of solvent to be passed through the sample, as well as a reduction in extraction temperature that would allow study of the role of bacteria in the weathering process.

5102 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 9283, 9347, 10146, 10651, 10652, 10653, 10837

10705 (CONF-821215—, pp 69-76) **Fermilab's approach to PCBs.** Baker, S.I. (Fermi National Accelerator Lab., Batavia, IL). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

A large number of transformers and capacitors are used in the operation of a high energy accelerator facility such as Fermilab's. Many transformers are contaminated with polychlorinated biphenyls (PCBs) and most of the capacitors are filled with askarel which typically contains 60 to 70% PCB. Fermilab's approach has been to first measure the PCB concentrations in all (ap-

proximately 200) large oil-filled transformers and inventory all the transformers and capacitors containing PCB. Next, a spill plan with installation of appropriate containment was developed. Finally, a program of PCB removal was begun. Approximately 40% of the oil-filled transformers contained PCBs in excess of 50 parts per million. Fourteen transformers have been processed at Fermilab to reduce PCB concentrations, including six of 11 askarel-filled transformers. One of the 11 askarel-filled transformers was shipped off the site for disposal. PCB capacitors have been removed from normally occupied areas where replacement capacitors were readily available. Storage of PCB oil has been eliminated and storage of PCB capacitors reduced to those spares currently needed for maintaining operations. 4 references, 1 figure, 1 table.

10706 **(DOE/EV/00703—5) Mid-Pacific Research Laboratory annual report, October 1, 1982-September 30, 1983.** Colin, P.L.; Harrison, J.T. III. (Hawaii Univ., Honolulu (USA). Office of Research Administration). Feb 1982. Contract AC08-76EV00703. 13p. NTIS, PC A02/MF A01. Order Number DE84005325.

Fiscal year 1983 marked the end of on-site operations of the Mid-Pacific Research Laboratory at Enewetak Atoll in the Northern Marshall Islands. With the departure of the laboratory staff from Enewetak on 22 September, research conducted by the resident scientific staff ceased. Henceforth, MPRL will exist in the form of a research readiness program involving a part-time technician at the Hawaii Institute of Marine Biology who will inventory and maintain residual scientific assets and be available to support expeditionary research efforts in the Pacific area. A summary of research efforts in FY 83 is reported including descriptions of the redistribution of coarse surface particles by callianassid to deeper layers of the sediment. The relationship of this bioturbation to the redistribution of Bravo event fallout is related.

10707 **(PB—83-255497) Movement of water and nitrate-nitrogen in a typical silt loam soil of western Kansas. Report for 1 Jul 1980-Sep 1982.** Stone, L.R. (Kansas Water Resources Research Inst., Manhattan (USA)). Sep 1982. 31p. (CONTRIB—238). NTIS, PC A03/MF A01.

During a 2-year study at Tribune, Kansas, the authors evaluated the movement of water and nitrate-nitrogen in a deep, silt loam soil derived from losses. Treatment was irrigation amount (76, 114, or 152 mm of water per irrigation) and the test crop was corn (Zea mays). All plots received a pre-plant irrigation of approximately 150 mm in April of each year. In November 1980 and in December 1981, 180 kg of nitrogen per hectare were applied to the plot area. Nitrate-nitrogen concentration in the soil profile was not significantly influenced by irrigation amount. Water use efficiency was significantly greater with the 114 and 152 mm irrigation amounts than with the 76 mm amount. Undoubtedly, excessive amounts of nitrogen fertilizers and excessive amounts of irrigation water could produce nitrate-nitrogen leaching from these soils.

10708 **(SNV-PM—1647) Hydrogeological conditions for leachate reduction at landfill sites.** Karlqvist, L.; Olsson, T. (Statens Naturvaardsverk, Solna (Sweden)). Mar 1983. 77p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751413.

The infiltration of rain water into disposed waste produces a contaminated leachate water. In order to protect the environment, it is usually necessary to collect the leachte water for chemical treatment, a procedure which carries great expenses especially if long pipe lines are required. In view of these facts the importance to reduce, as far as possible, the leachate from existing land-fill sites is evident. The present report presents a theoretical study of the conditions which govern the leachate production. The theoretical part is supported and illustrated by results from an on-going field study. The following parts of the production process has been studied: The amount of water available for infiltration. Distribution in time and intensity. The water content in the uppermost part of the deposit including covering and sealing layers. Distribution with time and saturation. The hydraulic conductivity of covering and sealing layers. The lateral water flow in the deposit. The study shows that natural soil types, normally available, have such a high infiltration capacity, that any significant sealing effect are not obtained. It is only possible to reduce the infiltration at periods with intense precipitation or rapid snow-melt, and then only the peaks in the leachate production. Nevertheless, the sealing and covering layers on the top of a deposit are of great importance as water reservoirs for the evapotranspiration.

5103 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 9465, 9514, 9516, 10680, 10682, 10686, 10688, 10691, 10692, 10751, 10951

10709 (CONF-821215—, pp 311-321) **Texas Panhandle soil-crop-beef food chain for uranium: a dynamic model validated by experimental data.** Wenzel, W.J. (Los Alamos National Lab., NM); Wallwork-Barber, K.M.; Rodgers, J.C.; Gallegos, A.F. Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Long-term simulations of uranium transport in the soil-crop-beef food chain were performed using the BIOTRAN model. Experimental data means from an extensive Pantex beef cattle study are presented. Experimental data were used to validate the computer model. Measurements of uranium in air, soil, water, range grasses, feed, and cattle tissues are compared to simulated uranium output values in these matrices when the BIOTRAN model was set at the measured soil and air values. The simulations agreed well with experimental data even though metabolic details for ruminants and uranium chemical form in the environment remain to be studied. 16 references, 7 figures, 2 tables.

10710 (INIS-mf—8572, pp 67-122) **Alpha-activities in environmental samples.** Irlweck, K.; Friedmann, Ch.; Schoenfeld, T.; Steger, F.; Streit, S. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H. Inst. fuer Strahlenschutz). 1982. (In German). NTIS (US Sales Only), PC A16/MF A01.

In Environmental radioactivity. Contributions to environment protection, provision affairs, veterinary administration.

Determination of $^{239}Pu(^{240}Pu)$ in human lungs from autopsies show for the period 1961 - 1965 lung burdens between 150 - 600 fCi and about 50 fCi/organ for the years 1978/79. In some cases also ^{241}Am and $^{234}U/^{238}U$ contents were analyzed. Air concentration measurements concerning $^{239}Pu(^{240}Pu)$ and uranium isotopes were carried out using air filters taken between 1962 - 1979 at a sampling station in Vienna. Additionally performed investigations about the α-activity of typical food stuffs allow a rough estimation of the intake for the general population. Based on statistical data and the results of activity measurements especially of ^{210}Po, ^{226}Ra, ^{232}Th and U(nat) in coals and the ashes, emissions from coal fired stationary sources are discussed.

10711 (INIS-mf—8572, pp 271-368) **Utilization of radioactive contaminated arable land and pasture in dependence of time.** Haunold, E.; Danneberg, O.H.; Horak, O.; Tuschl, P. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H. Inst. fuer Landwirtschaft). 1982. (In German). NTIS (US Sales Only), PC A16/MF A01.

In Environmental radioactivity. Contributions to environment protection, provision affairs, veterinary administration.

In the course of literature considerations are made about the utilization of arable land and agriculture products after radioactive contamination, especially under the given conditions of Austria. Firstly sources of radioactive contamination and the different kinds of fission products are discussed, followed by the description of the effects of different climate factors on the translocation of radionuclides. After the description of the different types of Austrian soils the behaviour of radionuclides in such soils is discussed. A great deal of the study is dedicated to the uptake and translocation of radionuclides by plants, especially by leaves and roots. Finally the transfer of the radionuclides from the soil to the plant tissue is discussed and some transfer factors are newly calculated. An extensive citation of the literature existing on these special problems is given.

10712 **(NRPB-R—133) Accidental releases of radionuclides: a preliminary study of the consequences of land contamination.** Simmonds, J.R.; Haywood, S.M.; Linsley, G.S. (National Radiological Protection Board, Harwell (UK)). Oct 1982. 56p. HMSO, London, price Pound4.00.

The long term consequences of land contamination from accidental releases of activity from thermal reactors are examined. The radiological consequences are assessed using an analysis of the exposure of individuals and the population to ground deposits of the radionuclides released. The contribution of the different nuclides in the release by their various exposure routes to the irradiation of man are calculated as a function of time after release and the most radiologically important are identified. A preliminary assessment is made of off-site economic and social consequences of accidental releases by estimating the areas of land which would be affected by the introduction of countermeasures to control individual radiation exposure due to external irradiation from ground deposits (relocation of populations), and the intake of radionuclides contained in locally produced foodstuffs (restrictions on food production). The areas where administrative controls would be necessary decline in size with time after the release; estimates are made of this time-dependent behaviour using dynamic environmental transfer models. Finally, the collective doses saved by the introduction of countermeasures are estimated using population and agricultural distribution data for a rural location in the United Kingdom.

10713 **(NUREG/CR—3574) Critical pathways of radionuclides to man from agro-ecosystems. Annual progress report, October 1981-September 1982.** Smith, M.H.; Alberts, J.J.; Adriano, D.C.; McLeod, K.W.; Pinder, J.E. III. (Savannah River Ecology Lab., Aiken, SC (USA)). Dec 1983. 48p. NTIS, PC A03/MF A01 - GPO $4.00. Order Number DE84900629.

This research program has as its primary objective the description of the fate and behavior of radionuclides released to the environment from nuclear fuel chemical separations facilities. It can be grouped into two general modes of scientific approach: 1) controlled environment greenhouse uptake experiments and 2) field studies. Both modes utilize the uniquely contaminated soils and/or the ongoing operations of the separations facilities at the SRP. The greenhouse experiments seek to determine the long-term availabiltiy of radionuclides to agricultural plants from soils contaminated by a chemical separations facility. In these experiments we are also investigating factors which might modify availability of nuclear contaminants such as different crop species, soil amendments, and soil types. The field research focuses primarily on the environmental behavior in agricultural corps of chronic low-level releases of uranium. From the greenhouse uptake studies, any temporal effect on Pu and Cm uptake is inconclusive, with variable effects from different crop species, radionuclides, and soil treatments. in plant tissues of wheat and soybean crops grown near F-Area separations facility, root uptake is more important in contributing to U concentrations than Pu. This is in distinct contrast to the behavior of Pu in agroecosystems, where surficial pathways are the dominant modes of contamination, and is probably related to (1) the ubiquitous presence of naturally occurring U isotopes and (2) a greater phytoavailability of U than did wheat. Completion of corn radionuclide analysis will allow comparisons between Pu and U behavior and among wheat, soybean, and corn crops.

10714 **(SIS—1981:13) ^{137}Cs in Norwegian Lapps spring 1981.** Westerlund, E.A.; Lind, B. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1981. 21p. (In Norwegian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704548.

Measurements show that the body burden of ^{137}Cs in Lapps in Norway fell between 1965 and 1975 with an apparent half-life of 4-5 years. Since then the reduction has been considerable slower due to fallout from Chinese nuclear weapons tests. The content of ^{137}Cs in reindeer meat follows the same pattern. Seasonal variations occur due to the migration of the reindeer between winter grazing on lichen with a high ^{137}Cs content and summer grazing on grass with a lower Cs content. For annual dose calculations it is found that whole-body measurements at the end of March or beginning of April give good values. The average body burden of ^{137}Cs in nomadic reindeer-herding Lapps corresponds to a whole-body irradiation of 15-20 mrem per year. Whole-body measurements made on employees at The Norwegian Radium Hospital indicate that radiation doses from body burden of ^{137}Cs in people in the Oslo area are far less than 1/10 of those of the Lapps.

10715 **(SIS—1982:8) Dosestatistikk for yrkeseksponerte i 1981.** Woehni, T. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1982. 10p. (In Norwegian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704328.

Paper copy only, copy does not permit microfiche production refs.

Statistical data is given on the result of personal monitoring of 5686 occupationally exposed persons in Norway in 1981.

10716 **(SKBF-KBS-TR—82-16) Movement of a redox front downstream from a repository for nuclear waste.** Neretnieks, I. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). 19 Apr 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704592.

In a final repository for nuclear waste it is envisaged that the waste will eventually come in contact with water. When this happens the α-radiation will radiolyse water. The main products will be hydrogen and hydrogen peroxide. The hydrogen is fairly nonreactive and will be transported away by diffusion and convection. The hydrogen peroxide is a strong oxidizing agent and will oxidize any ferrous iron it encounters to ferric iron. This will change the electrochemical potential of the water in the region, from reducing to oxidizing conditions. In oxidizing waters many of the potentially hazardeous radionuclides - actinides and technetium - will have a high solubility and low sorption compared to conditions. The movement of the redox front along the fissures downstream of a repository has been investigated theoretically. The rock is modelled as having parallel fissures where the water flows. The rock matrix has a connected porosity into which the hydrogen peroxide diffuses and quickly reacts with the minerals containing ferrous iron. The movements of the sharp boundary between oxidizing and reducing conditions in the fissures as well as in the matrix of the rock is described mathematically. A calculated example based on expected flowrate of water, rate of α-radiolysis, fissure spacing and measured values of matrix diffusivity and ferrous iron content of the bedrock is made. The results indicate that under some conditions the redox front may move tens of meters downstraem during 10^6 years in fairly good rock, poor in ferrous iron. It is conceivable that the extension of the redox front is larger as well as shorter because many of the importhat factors governing teh front movement may vary considerably.

10717 **(SKBF-KBS-TR—83-01) Radionuclide transport in a single fissure. A laboratory study.** Eriksen, T.E. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). 19 Jan 1983. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704594.

Radionuclide migration have been studied in natural fissures oriented parallel to the axis of granite drill cores. A short pulse of the radionuclides solution was injected at one end of the fissure and the temporal change in radionuclide concentration of the eluate measured. After several hundred fissure volumes water had been pumped through the fissure following the radionuclide pulse the activity distribution on the fissure surfaces was measured. From the retardation of ^{152}Eu, ^{235}Np and ^{237}Pu it is concluded that these radionuclides are transported in the oxidation states Eu(III), Pu(IV) and Np(V). The distribution coefficients K sub (d) calculated from flow and activity distribution data on the basis of geometric surface area/volume ratios are of the same order as published K sub (d) values obtained from batch equilibrium experiments.

10718 **(SSI-A—83-07) Gamma radiation in apartments.** Grindborg, J.-E. (Statens Straalskyddsinstitut, Stockholm (Sweden)). May 1983. 32p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704329.

This investigation forms the basis for the description of methods for the detection of gamma radiation. The aim is to control that the dose limit will not exceed 50 μR/h in a room where people reside. The distribution of dose rates in different rooms has been calculated and the results have been compared with experi-

mental data. Various instruments have been calibrated and their specifications are discussed.

10719 **An evaluation of soil sampling for ^{137}Cs using various field-sampling volumes.** Nyhan, J.W.; White, G.C.; Schofield, T.G.; Trujillo, G. (Los Alamos National Lab., NM). *Health Physics;* **44**: No. 5, 541-552(May 1983). Contract W-7405-ENG-26.

The sediments from a liquid effluent receiving area at the Los Alamos National Laboratory and soils from an intensive study area in the fallout pathway of Trinity were sampled for ^{137}Cs using 25-, 500-, 2500- and 12,500-cm^3 field sampling volumes. A highly replicated sampling program was used to determine mean concentrations and inventories of ^{137}Cs at each site, as well as estimates of spatial, aliquoting, and counting variance components of the radionuclide data. The sampling methods were also analyzed as a function of soil size fractions collected in each field sampling volume and of the total cost of the program for a given variation in the radionuclide survey results. Coefficients of variation (CV) of ^{137}Cs inventory estimates ranged from 0.063 to 0.14 for Mortandad Canyon sediments, whereas CV values for Trinity soils were observed from 0.38 to 0.57. Spatial variance components of ^{137}Cs concentration data were usually found to be larger than either the aliquoting or counting variance estimates and were inversely related to field sampling volume at the Trinity intensive site. Subsequent optimization studies for the sampling schemes demonstrated that each aliquot should be counted once, and that only 2-4 aliquots out of as many as 30 collected need be assayed for ^{137}Cs. The optimization studies showed that as sample costs increased to 45 man-hours of labor per sample, the variance of the mean ^{137}Cs concentration decreased dramatically, but decreased very little with additional labor.

10720 **Radionuclide transport processes in terrestrial ecosystems.** Whicker, F.W. (Colorado State Univ., Fort Collins, CO). *Radiation Research;* **94**: No. 1, 135-150(Apr 1983). Contract AC02-79EV10305;AS08-79NV10057.

Some major principles and the status of knowledge concerning the transport of radionuclides through terrestrial ecosystems are reviewed. Fundamental processes which control the flow of radionuclides between ecosystem components such as air, soil, plants, and animals are described, with emphasis on deposition, resuspension, plant uptake, ingestion, and assimilation. Properties of radionuclides, organisms, and ecosystems are examined in relation to their influence on the accumulation of radioactive materials by plants and animals. The effects of the physicochemical nature of the radionuclide; morphology, physiology, and behavior of the organism; and soil, nutrient, and trophic characteristics of the ecosystem are highlighted. Observations in natural ecosystems on radionuclides such as ^{137}Cs, ^{90}Sr, ^{131}I, ^{3}H, and ^{239}Pu are used to illustrate current concepts. An assessment of the degree to which the processes controlling radionuclide behavior are understood and of our ability to simulate and predict such behavior with computerized models is offered. Finally, brief comments are made on research needs.

10721 **Counting system and resultant data from field determinations of ^{226}Ra at twelve uranium mill tailings sites.** Rarrick, H.L.; Minnema, D.M.; Brewer, L.W. (Sandia National Labs., Albuquerque, NM (USA)). pp 633-642 of Management of wastes from uranium mining and milling. Proceedings of an international symposium jointly organized by the IAEA and the OECD/NEA and held in Albuquerque, 10-14 May 1982. Vienna, Austria; IAEA (1982). (CONF-820552—; STI/PUB—622; IAEA-SM—262/45).

From International symposium on management of waste from uranium mining and milling; Albuquerque, NM, USA (10 May 1982).

A nuclear counting system has been developed and placed in service to determine the radium-226 content of soils within and beneath uranium mill tailings piles. Minimum detectable activity is approximately 3 pCi $^{226}Ra/g$ of soil in a 0.5 mR/h background with a 3-minute count. The counting system consists of a lead shield for holding core barrel samplers, a NaI crystal coupled to a photomultiplier (PM) tube, a preamplifier and amplifier, two single-channel analysers (SCAs), a programmable calculator, and a 500 W portable generator. The counting system, installed in a delivery van, was used to count 2773 samples during 10 months under extreme field conditions. Approximate cost of the system excluding vehicle is US $8000. Vertical profile holes of the tailings piles exhibited ^{226}Ra activities from over 2000 pCi/g to 15 pCi/g. ^{226}Ra contamination levels in the soil beneath the tailings varied from 1000 pCi/g to background.

5105 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 9286, 9347, 9468, 9492, 9992

10722 (CONF-821215—, pp 87-94) **Assessment of DOE inactive chemical waste sites: are adequate inventory data available.** English, C.J.; Denham, D.H. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

An approach to data collection regarding past chemical waste generation at DOE site has been developed by PNL. This approach, purposely general, deals with the tremendous site to site variations that exist, both in the nature of activities conducted and in the availability of records describing past waste management. In addition, the paper describes some of the lessons learned in applying this approach at the DOE Hanford Site. The results of this effort indicate that adequate data should be available at most sites to place bounds on potential uncontrolled chemical waste site problems. 1 table. (JMT)

10723 **(PB—83-258723) Illinois land report: Rice Lake Conservation Area. Volume 2. Comments and responses, appendices, references. Final report.** (Illinois Dept. of Energy and Natural Resources, Springfield (USA)). 29 Aug 1983. 327p. NTIS, PC A15/MF A01.

This report was authorized by the Illinois Surface Coal Mining Land Conservation and Reclamation Act (PA 81-1015). It was prepared in response to a petition from a citizen's organization (Save Rice Lake Area Association) which requested that the Rice Lake Conservation Area, owned by the Illinois Department of Conservation, be declared unsuitable for surface coal mining. This declaration of suitability or unsuitability will ultimately be made by the Illinois Department of Mines and Minerals. PA 81-1015 provides that ENR must prepare land reports on such lands. The Land Report analyzes the demand for coal and the impact which a declaration of unsuitability would have on the economy, environment and the coal supply. In addition, the report discusses the impact of mining on state and local land use plans, fragile and historic lands, renewable resource lands and natural hazard lands.

10724 **(PB—83-261099) Feasibility of in situ solidification/stabilization of landfilled hazardous wastes. Final report Nov 81- Mar 82.** Truett, J.B.; Holberger, R.L.; Barrett, K.W. (Mitre Corp., McLean, VA (USA)). Sep 1983. 93p. NTIS, PC A05/MF A01.

This report discusses the feasibility of solidifying or stabilizing hazardous industrial wastes that are already in place at a landfill. Solidification methods considered include (1) incorporating the waste into solids, (2) fusing the waste with soil, and (3) isolating the waste by enclosing it in impermeable inert envelopes or smaller capsules. None of the solidification methods appears generally applicable to large landfills containing mixed industrial wastes, although two methods appear promising for some specific applications. The more promising methods were examined for possible application at the 8.5 acre LaBounty site at Charles City, Iowa. None of the solidification/stabilization methods appears suitable for in situ application at this site because of large variations in the permeability of the fill material and the diverse chemical composition of the wastes. This report was submitted in fulfillment of Contract No. 68-02-3665 by the Mitre Corporation under sponsorship of the USEPA. This report covers the period November 1981 to March 1982 and work was completed as of April 1982.

5106 Regulations

REFER ALSO TO CITATION(S) 9987, 9991, 10028

52 ENVIRONMENTAL SCIENCES, AQUATIC

5201 Basic Studies

REFER ALSO TO CITATION(S) 10002

10725 **(BNL—33356) Quantitative analysis and simulation of Mediterranean coastal ecosystems: the Gulf of Naples, a case study.** Hopkins, T. (ed.). (United Nations Educational, Scientific and Cultural Organization, 75 - Paris (France); Stazione Zoologica, Naples (Italy)). 1982. Contract AC02-76CH00016. 163p. (CONF-8103182—Summ.). NTIS, PC A08/MF A01. Order Number DE84002431.

From Workshop on ecosystem modelling; Naples, Italy (28 Mar 1981).

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A workshop on the modelling of Mediterranean coastal ecosystems was held in the Ischia Benthic Ecological Laboratory of the Naples Zoological Station from 28 March to 10 April, 1981. The primary activity was the engagement of all participants in the various steps of model construction for the case study, the Gulf of Naples. This included an examination of the data base, design of a conceptual model, decomposition into submodels, formulation of relevant processes, definition of initial and boundary conditions, and programming and simulation. Secondary activities included a series of introductory lectures to establish a common modelling language among the participants, the presentation of other Mediterranean ecosystems, general discussions involving the practical application of modelling to particular situations, and a workshop critique. 414 references, 92 figures.

10726 **(DOE/EV/00936—7) Biological processes in the water column of the South Atlantic Bight. Progress report, June 1982-June 1984.** Paffenhofer, G.A.; Yoder, J.A. (Skidaway Inst. of Oceanography, Savannah, GA (USA)). 1 Dec 1983. Contract AS09-76EV00936. 21p. NTIS, PC A02/MF A01. Order Number DE84004336.

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Research has been directed toward understanding phytoplankton dynamics and related processes in nearshore waters. This report summarizes work on the limitation of phytoplankton growth by nutrients in nearshore waters, the inhibition of the rate of phytoplankton production by wind and tide-induced vertical mixing within the turbid nearshore waters, the influence of the coastal frontal zone on the spatial distributions of phytoplankton biomass, primary production and plant nutrients, and zooplankton abundance, distribution and production in relation to hydrographic variables. (ACR)

10727 **(FWS/OBS—83/26) Subsidence in coastal Louisiana: causes, rates, and effects on wetlands.** Boesch, D.F.; Levin, D.; Nummedal, D.; Bowles, K. (Louisiana Universities Marine Consortium, Chauvin (USA); Louisiana State Univ., Baton Rouge (USA). Dept. of Geology). Aug 1983. 39p. Minerals Management Service, Dept. of the Interior, Washington, DC 20240.

Coastal wetlands are being lost at a rapid and accelerating rate in Louisiana. Much of this loss is attributable to a relative lowering of the wetland surface below the level adequate to support vegetation. Such rapid subsidence is a natural phenomenon, related to the progradation and abandonment of distributary lobes of the Mississippi river Deltaic Plain. For a considerable period after abandonment of new sediment sources, wetlands are able to keep pace with subsidence by accreting sediments reworked by marine processes. But inundation of interior wetlands removed from such an active sediment supply, wave exposure, and saltwater intrusion eventually result in deterioration of the wetlands. Human activities may accelerate this process by disrupting sediment supplies for wetland accretion, raising global sea level, causing saltwater intrusion, and withdrawals of subsurface materials. Present subsidence rates from tide gauge records exceed 40 mm/yr at the modern Mississippi River delta and approximate 10 mm/yr in wetlands near the gulf coast. Subsidence rates over the last 1000 years appear to have been half the rates presently observed. This either results from natural variability, inaccuracy of tide gauge records, or human influences. The effect of the high rate of increase in locally apparent sea level on wetlands is difficult to quantitatively predict because of local variations in subsidence and accretion, uncertainty regarding future global sea level, and lack of knowledge of the accretionary limits of wetlands. 66 references, 10 figures, 2 tables.

10728 **The effects of light on the dissipation of chlorine in sea-water.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA). *Water Research;* **14**: 1263-1268(1980). Contract AS05-77EV05572.

The presence of light, even in intensities of only a few per cent of full midday sun, may affect significantly both the rate and the mechanism of the dissipation of chlorine in sea-water. Light increases the rate of dissipation of hypobromite formed from the added chlorine. Bromate is one of the products formed when chlorinated sea-water is exposed to light. The rate and the amount of bromate formed increases with increasing intensity of light. Within the time elapsed during the experiments (up to 5000 min), bromate is stable in sea-water. The increase in chlorine demand in the presence of light can be accounted for only partially by the formation of bromate. Other, yet unidentified reactions also occur. Aside from bromate, one or more unidentified species react with iodide to form tri-iodide at pH 1.4 but not at pH 4. These species are produced both in the dark and in the presence of light, and they are unstable in sea-water. The rate and the amount of these species formed vary with the intensity of light. This can be partially explained by the increasing rate of the competing reaction, the formation of bromate, with increasing light intensities.

10729 **Some problems in the determination of total residual "chlorine" in chlorinated sea-water.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA). *Water Research;* **14**: 51-60(1980). Contract AS05-77EV05572.

In the determination of residual chlorine in sea-water by the amperometric titrimetric method, potassium iodide must be added to the sample before the addition of the pH 4 buffer, and the addition of these two reagents should not be more than one minute apart. Serious analytical error may arise if the order of the addition of the reagents is reversed. There is no evidence suggesting the formation of iodate by the reaction between hypobromite and iodide. For concentrations of residual chlorine below one mg l^{-1}, iodate, which occurs naturally in sea-water, may cause serious analytical uncertainties. In sea-water, the preferred concentration unit of residual chlorine is μM. The unit, mg l^{-1}, must be used with care and clear definition. The unit, ppm, should be avoided.

10730 **The stability of dissolved inorganic species of iodine in seawater.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA). *Marine Chemistry (Amsterdam);* **9**: 13-24(1980). Contract AS05-77EV05572.

An oxidation state diagram was used to study the relative stability of inorganic iodine species in an aqueous system. It is shown that although iodate is the most stable form, iodide may exist as a metastable form in a basic solution. Molecular iodine may undergo disproportionation to form iodide and iodate. Results from laboratory studies suggest that molecular iodine is rapidly taken up by seawater, and hypoiodite is probably formed. Hypoiodite is also unstable in seawater, and may react with organic matter or undergo autodecomposition. Direct reactions between molecular iodine and organic matter were not observed.

10731 **The oxidation state diagram--a potential tool for studying redox chemistry in seawater.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA). *Marine Chemistry (Amsterdam);* **9**: 1-12(1980). Contract AS05-77EV05572.

With minor modifications, the oxidation state diagram may be used to study the redox chemistry of elements in marine waters. In addition to indicating the most stable oxidation state of an element, the diagram also shows the possible existence of metastable

species. Oxidation state diagrams of the nitrogen and the manganese systems are presented. The inferences drawn from these diagrams are consistent with our present understanding of the marine geochemistry of these elements.

10732 **The effect of temperature on the dissipation of chlorine in seawater.** Wong, G.T.F. (Old Dominion Univ., Norfolk, VA). pp 395-406 of Water chlorination environmental impact and health effects volume 3. Jolley, R.L.; Brungs, W.A.; Cumming, R.B. (eds.). Ann Arbor, MI; Ann Arbor Science Publishers Incorporated (1980). (CONF-7910138—). Contract AS05-77EV05572.

From 3. conference of chlorination: environmental impact and health effects; Colorado Springs, CO, USA (28 Oct 1979).

Chlorine gas or hypochlorite has been frequently added to the coolant of power plants as an antifoulant. When chlorinated seawater is passed through the cooling conduits in a power plant, the water is heated. The effect of temperature on the dissipation of chlorine in seawater was examined. It was found that the rate of chlorine consumption is affected by temperature changes. With the same amount of added chlorine, chlorine demand increases with temperature. Even for short contact times of a few tens of minutes, substantially higher chlorine demand has been observed. If the consumption of chlorine in seawater is considered to occur in two phases, the initial chlorine demand increases monotonically with temperature. The increase in chlorine demand with dosage is caused primarily by this increase in initial chlorine demand. The rate constants of the reactions in the second phase stay relatively constant from 25 to 30°C and increase significantly at 40 and 50°C. This suggests that the routes and the mechanisms of the reactions may change at elevated temperatures. Studies conducted without considering the temperature history of the coolant may not be applicable to real situations. Amperometric titrations at pH 4 and iodometric titrations at pH 1.4 give different residual chlorine concentrations. The difference is real and is caused primarily by the smaller initial chlorine demand determined by the iodometric titrations. Both methods yield similar rate constants in the second phase of reactions. The product that reacts with iodide to form triiodide ion at pH 1.4 but not at pH 4 is produced in the first phase of reaction.

10733 **Isotopic and chemical techniques in hydrology, with application to Blue Lake, Southeastern Australia.** Turner, J.V. Bedford Park, South Australia; Flinders University (1979). 232p. Available from the University Library.

A small maar lake in S.E. Australia provides the water supply for a population of about 20000, resulting in removal of about 10% of the lake volume per annum. A primary objective of the study was to estimate the relative contributions of groundwater from each of two possible source aquifers. The upper unconfined aquifer has been seriously polluted in the immediate vicinity of the lake resulting in point sources of contaminaton as high as 490 mgl^{-1} nitrate, while the deeper confined aquifer remains uncontaminated. Estimation of groundwater throughflow in the lake was assessed by measuring the levels of ^{3}H, ^{2}H, ^{14}C, ^{13}C and ^{18}O in lake waters and in recharging groundwater. Results indicate a total groundwater inflow to Blue Lake of 4-6 10^{6} $m^{3}yr^{-1}$, with a corresponding residence time of about 6 years. Evaporation pan experiments were conducted to estimate molecular exchange and isotopic fractionation effects for ^{3}H, ^{18}O and ^{2}H. Establishment of ^{13}C and ^{14}C and carbon mass balances for Blue Lake facilitated estimation of the carbon dioxide exchange flux across the air water interface as approximately 40M m^{-2} yr^{-1}. Use of the water balance information together with uranium data and conventional hydrologic and hydrogeochemical data has shown that a major proportion (60-80%) of recharge to Blue Lake originates from the confined aquifer. Carbon-14 data have been utilized to provide a preliminary estimate of 1-3 m yr^{-1} for the groundwater velocity in the confined aquifer.

5202 Chemicals Monitoring And Transport

REFER ALSO TO CITATION(S) 9281, 9316, 9343, 9344, 9345, 9348, 9349, 9350, 9351, 9352, 9354, 9373, 9616, 10651, 10652, 10680, 10932

10734 (CONF-821215—, pp 459-469) **Monitoring for organic contaminants in ground water.** Myers, D.A.; Meuser, J.M. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Ground-water monitoring at DOE sites has been predominantly oriented toward the collection and interpretation of radiological data. In addition, there is cause for concern over the potential for ground-water contamination by organic chemical constituents entering the environment from energy-related activities. Many of these constituents are potential carcinogens that exhibit low threshold limits, and have half-lives that approach infinity. Monitoring for these chemicals requires special tools, techniques, and procedures to assure the quality of samples. Well structures must be nonreactive with the monitored species. Sampling procedures must minimize air contact. Requirements for preserving samples may range from simple refrigeration to the use of sealed septum bottles. Because the volatile nature of some of these contaminants, the sample may require special handling in the laboratory as well. The sample must be analyzed as soon after collection as possible. Laboratories certified for the necessary analyses are few and are often located far from the area of sample collection. Pacific Northwest Laboratory (PNL) has developed strategies that assure the proper handling of samples from collection to completion of anlayses. These plans have been used for a number of Department of Defense studies and can easily be used for other similar efforts. 5 references, 1 figure, 2 tables.

10735 (CONF-821215—, pp 481-488) **Oak Ridge Y-12 Plant groundwater monitoring and assessment program.** Pritz, P.M. (Oak Ridge Y-12 Plant, TN). Aug 1983. NTIS, PC A24/MF A01. Contract W-7405-ENG-26.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The Y-12 Plant is currently monitoring 16 Resource Conservation and Recovery Act wells on a quarterly basis and 18 additional wells on an annual basis. These monitoring wells are located both upgradient and downgradient of the disposal facilities. Sampling is performed by the Environmental Monitoring Group using procedures established by the Department of Energy and Federal and State regulations. The samples are analyzed in the Y-12 Plant Laboratory, which is certified by the Environmental Protection Agency (EPA). A program to locate, identify, and catalog approximately 100 wells in Bear Creek Valley and the areas surrounding the Y-12 Plant, will hopefully expand and enhance our knowledge of the groundwater characteristics in this area. Plans include establishing high and low groundwater elevation tables, flow directions and velocities, and mineralization characteristics, and acquiring supplemental shallow seismic and resistivity measurements. Subsequently, the location of wells used for monitoring data will be reevaluated and revised where necessary. 4 figures. (JMT)

10736 (CONF-8306160—1) **Limnological and ecological changes associated with reservoir aging.** Kimmel, B.L.; Groeger, A.W. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 23p. NTIS, PC A02/MF A01. Order Number DE84003199.

From American Fisheries Society symposium on reservoir fisheries management; Lexington, KY, USA (14 Jun 1983).

Much scientific attention has been devoted to the trophic upsurge and depression observed in recently impounded reservoirs; however, little is known of the longer-term consequences of reservoir aging. Changes in the trophic status of water bodies are often a consequence of man-induced alterations of the watershed, rather than a result of the natural, gradual accumulation of nutrients and sediments. Because the formation of a man-made impoundment frequently promotes additional land-use change and technological development within the reservoir watershed, changes in water quality and biological productivity due to natural reservoir aging may be

minor compared to the effects of man-induced alterations of watershed-reservoir interactions. Future trends in the reservoir water quality and sport fisheries production will depend more on our ability to effectively conduct coordinated terrestrial and aquatic resources planning and management on a whole-watershed scale than on the consequences of reservoir aging per se. Coordinated research on selected impoundments and their watersheds is needed (1) to determine the sensitivity of reservoir ecosystems to various levels of watershed perturbation, and (2) to evaluate the effectiveness of integrated management strategies. 42 references, 3 figures.

10737 **(DOE/EV/00890—7) Trace element geochemistry of the South Atlantic Bight. Progress report.** Windom, H.L. (Skidaway Inst. of Oceanography, Savannah, GA (USA)). Dec 1983. Contract AS09-76EV00890. 18p. NTIS, PC A02/MF A01. Order Number DE84005141.

This report summarizes work accomplished on processes affecting the concentrations and distributions of trace elements in South Atlantic Bight waters. New studies were initiated on metal analysis of nearshore sediments. (ACR)

10738 **(DOE/EV/02185—T1) Transport and transfer rates in the waters of the Continental Shelf. Annual report, June 1, 1981-April 30, 1984.** Biscaye, P.E. (Columbia Univ., Palisades, NY (USA). Lamont-Doherty Geological Observatory). Oct 1983. Contract AC02-76EV02185. 74p. NTIS, PC A04/MF A01. Order Number DE84004087.

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The objective has been to understand processes and to quantify the rates at which pollutants are introduced into dispersed through, and removed from the system. This report summarizes work on processes associated with suspended particulate matter, processes associated with sediments as sinks and sources, spreading of water characteristics and species in solution, and field work on SEEP cruises. (ACR)

10739 **(DP-MS—83-98) Onsite treatment of volatile organic compounds in groundwater.** Steele, J.L. (Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant). 1983. Contract AC09-76SR00001. 21p. (CONF-8311121—1). NTIS, PC A02/MF A01. Order Number DE84003032.

From Fall conference of theWater and Pollution Control Association of South Carolina; Myrtle Beach, SC, USA (2 Nov 1983).

Volatile organic compounds (trichloroethylene and tetrachloroethylene) were discovered in a shallow groundwater zone. A three-phase program was implemented to systematically address the problem. Principal sources and location of the contaminants were identified along with appropriate remedial action technology. A pilot air stripping column was installed to evaluate air stripping. A 50-gpm production unit is being built and will be followed by a 400-gpm production unit.

10740 **(IAEA-R—1793-F) Persistence of organophosphorus pesticides in aquatic environments. Coordinated programme on isotope-tracer-aided research and monitoring on agricultural residue - biological interactions in aquatic environment. Final report for the period 1 July 1976 - 31 July 1982.** Horvath, L. (International Atomic Energy Agency, Vienna (Austria)). Aug 1982. 8p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704321.

A radiometric enzymic assay method was developed for quick measuring of organophosphorous insecticides in water samples. All steps of the assay procedure were carried out in scintillation vials. 50 μl enzyme solution (acetylcholinesterase of electric eel) and 50 μl buffer pH 7 were pipetted into the vial followed by 100 μl of water sample or aqueous solution of the insecticide and the mixture was incubated for 60 minutes. 50 μl ^{3}H-acetylcholine were added to the vial and the enzymic reaction stopped after 10 minutes by adding 200 μl buffer solution pH 2.5. 10 ml scintillation cocktail were then added and after shaking and 30 minutes standing the radioactivity was determined in a liquid scintillation spectrometer. Acetylcholine remained in the water phase while ^{3}H-acetic acid released in enzymic hydrolysis may be extracted by an organic solvent. By this method, not only the parent compound but also some of its degradation products, which possess some anticholinesteratic activity can be measured. The method is suitable for combination with thin-layer chromatography for identification purposes. Using this method, we studied the degradation of the organophosphorous insecticides malathion, parathion, DDVP and imidan. The degradation in distilled water and natural water was compared. For example, the half-time of malathion in distilled water at room temperature was 6 days while in natural water (Danube river) it was 4 hours. The degradation processes were also studied in model systems containing sediment and water. Degradation was faster in models containing solid particles than in filtered water. The radiometric enzymic method was tested as analytical procedure for residue monitoring.

10741 **(IAEA-R—2704-F) Interaction of pesticides and microorganisms in aquatic ecosystems. Part of a coordinated programme on isotopic-tracer-aided research and monitoring on agricultural residue-biological interactions in aquatic ecosystems. Final report for the period 1 November 1980 - 30 June 1982.** Sovljanski, R. (International Atomic Energy Agency, Vienna (Austria)). Sep 1982. 1p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704550.

10742 **(NUREG/CR—3478) Review of the impact of copper released into freshwater environments.** Harrison, F.L.; Bishop, D.J. (Lawrence Livermore National Lab., CA (USA)). Sep 1983. Contract W-7405-ENG-48. 94p. (UCRL—53488). NTIS, PC A05/MF A01 - GPO. Order Number DE84004817.

The concentrations of copper in the abiotic and biotic compartments of freshwater ecosystems, and the effects on biota of increased amounts of copper in the water and sediments are reviewed. Data compiled and discussed include the quantities and physicochemical forms of copper in the water column, the concentrations of copper in the bed-load sediments and interstitial waters, and the concentrations of copper in primary producers, molluscs, crustacea, aquatic insects, other invertebrates, and fishes. In addition, the acute and sublethal effects of copper on the same groups of biota are presented, as well as data on copper concentration factors. This information can be used to: (1) determine the ranges of copper concentrations that occur in nature for different types of ecosystems; (2) identify ecosystems that are or may be impacted by copper released from industrial and urban sources; and (3) assess the effects of biota of the use of copper alloys in nuclear power station cooling systems.

10743 **(SNV-PM—1658) Effects of lake acidification on bird populations.** Eriksson, M. (Statens Naturvaardsverk, Solna (Sweden)). Apr 1983. 49p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751412.

In lakes damaged by acid rain, biological changes due to two kinds of effects occur: direct effects due to abiotic factors, such as mortality among, for example, fish and molluscs after exposure to low pHvalues, often in combination with metal pollutants; and effects due to the disappearance of key organisms such as fish. When considering the utilization by birds of acidified waters, both these kinds of effects must be taken into account. This report gives a review of the literature in this area and suggest subject for future research.

10744 **(USGS/WRI—82-4047) Hydrologic effects of storing liquified sewage sludge on strip-mined land, Fulton County, Illinois.** Patterson, G.L. (Geological Survey, Champaign, IL (USA)). Dec 1982. 33p. USGS Open-File Services Section, Western Distribution Branch, Box 25425-Federal Center, Lakewood, CO 80225.

The water table near four sewage sludge storage basins in a strip-minned area of western Illinois, has risen about 10 feet since the basins were constructed in 1971. Two-dimensional modeling of groundwater flow in the mine spoil indicates that the rise is caused by leakage from storage basin 1. The principal components of the sewage sludge after the solids have been removed are alkalinity, nitrogen, phosphorus, and chloride. In ground water away from the storage basins, the principal cation was magnesium, whereas in that

near the basins, the principal cation was sodium. Components in higher concentrations near the basins were sodium, alkalinity, and chloride. Sulfate was the principal anion in both areas. Because the sodium and chloride concentrations in the sludge were too low to cause the higher concentrations in the ground water, the strip-mine spoil used in constructing the basins was considered to be the major source of these constituents. This spoil had been removed from its original location and unweathered surfaces exposed, which allowed dissolution of carbonate and chloride and release of sodium through cation exchange. 5 references, 11 figures, 10 tables.

10745 **Polycyclic aromatic hydrocarbon (PAH)-phase associations in Washington coastal sediment.** Prahl, F.G.; Carpenter, R. (Univ. of Washington, Seattle). *Geochimica et Cosmochimica Acta;* **47**: No. 6, 1013-1023(Jun 1983). Contract EN-77-S-01-6173.

Polycyclic aromatic (PAH) and aliphatic hydrocarbon compositions, organic carbon, nitrogen and lignin contents were determined in whole, unfractionated sediment from the Washington continental shelf and in discrete sediment fractions separated by particle size and density. At least 20 to 25% of perylene and PAH derived from pyrolytic processes and 50% of the retene measured in whole sediment are contained within organic C- and lignin-rich particles of density ≦ 1.9 g/cc. These particles, which include primarily vascular plant remains and bits of charcoal, comprise less than 1% of the total sediment weight. In contrast, a series of methylated phenanthrene homologs, possibly of fossil origin, are concentrated in some component of the more dense, lithic matrix of the sediment. Equilibrium models of PAH sorption/desorption from aqueous phase onto small particles of high surface area do not appear applicable to the behavior of the major PAH types in this aquatic environment.

10746 **Entrainment of viruses from septic tank leach fields through a shallow, sandy soil aquifer.** Vaughn, J.M.; Landry, E.F.; Thomas, M.Z. (Brookhaven National Lab., Upton, NY). *Applied and Environmental Microbiology;* **45**: No. 5, 1474-1480(May 1983).

A study was conducted which focused on movement of naturally occurring human enteroviruses from a subsurface wastewater disposal system through a shallow aquifer. The potential for significant entrainment of virus particles was evidenced by their recovery at down-gradient distances of 67.05 m and from aquifer depths of 18 m. A significant negative correlation was observed between virus occurrence and the distance from the "septage" (leaching pool) source. Virus occurrence could not be statistically correlated with either total or fecal coliforms, indicating the limitations of current microbial water quality indicators for predicting the virological quality of groundwater.

10747 **Quantitative electron spin resonance (ESR) determinations of forms and total amounts of Mn in aqueous environmental samples.** Carpenter, R. (Univ. of Washington, Seattle). *Geochimica et Cosmochimica Acta;* **47**: No. 5, 875-885(May 1983). Contract AT06-76EV70024.

An electron spin resonance (ESR) method for determining quantitatively amounts and forms of Mn in 0.2 ml of marine and lacustrine waters with no chemical processing is described and applied to various samples from the Puget Sound region of western Washington state. Results over the 50 ppb - 15 ppm (0.9 - 270 μM) total Mn concentration range are reproducible to within +/- 3-5% and average 8 +/- 7 and 13 +/- 7% lower than inductively coupled plasma (ICP) determinations on marine and lacustrine pore waters respectively. Main features in profiles of total Mn versus depth in Pacific Northwest pore waters resemble those in profiles from other coastal regions. The method reveals that 72-77% of total dissolved Mn is present as free Mn^{++} in most seawaters, 14-16% is complexed with chloride, and 10-12% is complexed with sulfate. Less than 5% is associated with carbonate, bicarbonate or organic ligands. These results should significantly reduce uncertainties in equilibrium calculations of state of saturation of seawaters with respect to precipitation of various Mn-solids. The method can be easily extended to various ionic strengths and temperatures.

5203 Radioactive Materials Monitoring And Transport

REFER ALSO TO CITATION(S) 9465, 9478, 9514, 9515, 9518, 10678, 10680, 10682, 10686, 10688, 10691, 10692, 10737, 10951, 10968

10748 (CONF-821215—, pp 153-162) **Water monitoring program at the Rocky Flats Plant.** Henry, R.L. (Rockwell International, Golden, CO). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The increased demand for water and the concern for the quality of the water resources of the United States has led to an increased interest to improve water sampling and analysis program. In particular, concern has been shown recently by the public for the amount of radioactive discharges into waters from nuclear facilities. Discussion includes what the Rocky Flats Plant is doing and has done to prevent the pollution of the streams and reservoirs surrounding the Plant. Annual average radioactivity concentration data for the period 1975 through 1981 indicate that Rocky Flats Plant has had no adverse environmental impact. Compilance with the National Pollution Discharge Elimination System (NPDES) permit program is discussed. 7 references, 2 figures, 1 table. (JMT)

10749 (CONF-8309195—1) **Chemical behavior of long-lived radionuclides in the marine environment.** Edgington, D.N.; Nelson, D.M. (Wisconsin Univ., Milwaukee (USA). Center for Great Lakes Studies; Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 49p. NTIS, PC A03/MF A01. Order Number DE84003448.

From International symposium on the behavior of long-lived radionuclides; LaSpezia, Italy (28 Sep 1983).

Measurements of long-lived radionuclides in the marine environment have provided a wealth of information regarding the physical, biological, and chemical processes which control the behavior of these and many other pollutants in the oceans. Their value as tracers for the dispersion, transport, and fate of pollutants in the oceans is largely dependent on the chemical properties of each individual radioelement. Differences in these properties, particularly in relation to their interaction with biotic or abiotic particulate matter, result in the separation of parent-daughter radioisotopes in the natural radioelement series or in changes in the ratios of fission and activation products. Such differences have provided the means to provide time scales for a variey of transport processes and to determine sedimentation rates. The properties of these radionuclides in the oceans can, in general, be predicted from the chemical properties of the stable elements. For those elements such as plutonium, for which there are no naturally-occurring stable isotopes, studies of their distribution in the oceans have provided a new important understanding of their chemical behavior. This behavior has not always agreed with what would have been predicted from laboratory studies carried out at far higher concentrations. Differences between observed distributions and laboratory predictions have highlighted the importance of correct experimental conditions in order to avoid confusing experimental artifacts. The interaction of radionuclides with particles in the oceans and marine sediments can be described in terms of simple ion exchange or adsorption equilibria.

10750 (INIS-mf—8572, pp 123-270) **Systematical investigation about the radiation burden of the population induced by the radionuclide concentration in the Danube.** Buchtela, K.; Tschurlovits, M.; Unfried, E. (Atominstitut der Oesterreichischen Universitaeten, Vienna). 1982. (In German). NTIS (US Sales Only), PC A16/MF A01.

In Environmental radioactivity. Contributions to environment protection, provision affairs, veterinary administration.

This report describes the basic theoretical considerations, discusses the concept of collective dose rates and describes the radioecology of the Danube. Sampling and measuring techniques are described and the procedure of ring analysis is tested. The results of the measurements lead to the following conclusion: Under consideration of the existing conditions and concentrations of radionuclides as well as the population concentration in the surroundings of the Danube a number of 7 sample taking places is too high. An

acceptable compromise seems to be 3-4 sample taking places at the Danube corresponding to the population concentration in this area.

10751 (INIS-mf—8642, pp 48) **Experience with gamma spectrometry of water and sediment samples in preoperational radioactivity monitoring.** Sedlacek, J.; Sebesta, F.; John, J. (Ceske Vysoke Uceni Technicke, Prague (Czechoslovakia). Fakulta Jaderna a Fysikalne Inzenyrska). May 1983. (In Czech). NTIS (US Sales Only), PC A04/MF A01. (CONF-8305140—Absts.).

From Conference on instrumental activation analysis - IAA 83; Klucenice, Czechoslovakia (30 May 1983).

10752 **(LPCC-T—82-03) Study of gamma-emitting radionuclides present in the sediments and algae of the "Baie de l'Orne" (Central Normandy Coast) collecting during the years 1980 - 1982.** Lepy, M.C. (Caen Univ., 14 (France). Lab. de Physique Corpusculaire). 1982. 112p. (In French). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84750261.

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The present status of some environmental effects of existing sources of gamn a-emitting radionuclides, along the central part of the Normandy Coast (Calvados shores and river Orne mouth) was determined. A systematic study was made on the behaviour of the marine sediments and brown alga 'Laminaria digitata' with regard to their properties as indicators of radioactive contamination. Marine sediments were collected in the river Orne at fixed locations and in the sea in and around the estuary from 1977 to 1982. Algae samples were picked up along the coast from 1980 to 1982, mostly on the western part of the Orne estuary. Dosimetry techniques employed have produced accurate and reliable results, despite the very low levels of activity involved. Gamma-emitting radionuclides present in the environment (chiefly ^{106}Ru, ^{137}Cs, ^{95}Zr) were identified and measured. Their behaviour in the marine sediments and in Laminaria digitata were determined. This study provides evidence on the presence of numerous gamma-emitting radionuclides in the marine environment of the central part of the Normandy coast, but, altogether with very low levels of radioactivity.

10753 **Reversible ion-exchange fixation of cesium-137 leading to mobilization from reservoir sediments.** Evans, D.W.; Alberts, J.J.; Clark, R.A. III. (Savannah River Ecology Lab., Aiken, SC). *Geochimica et Cosmochimica Acta;* **47**: No. 6, 1041-1049(Jun 1983). Contract AC09-76SR00819.

The radioactive fission product, ^{137}Cs, has been observed to mobilize from bottom sediments of two South Carolina reservoirs during summer thermal stratification and hypolimnetic anoxia. Mobilization is attributed to ion-exchanged displacement of ^{137}Cs from sediments by cations such as NH^+_4, Fe^{+2} and Mn^{+2} released under anaerobic conditions. Three types of ^{137}Cs binding sites to sediment clay minerals are identified: 1) surface and planar sites from which ^{137}Cs is generally exchangeable by all cations studied (Na^+, NH^+_4, H^+, Cs^+, Ca^{+2}, Mg^{+2}, Fe^{+2}, and Mn^{+2}); 2) wedge sites where ^{137}Cs exchange is sterically limited to cations of similar size and charge (NH^+_4, Cs^+, K^+, and perhaps H_3O^+); 3) interlayer sites from which ^{137}Cs is not readily exhanged. More than 15 years after final ^{137}Cs inputs reservoir sediments studied showed the following percentage distribution of sites: 2 to 9% surface sites, 6 to 13% wedge sites, and 78 to 85% interlayer sites. In contrast, lake and stream sediments near Oak Ridge, Tennessee receiving ^{137}Cs inputs more than 20 years earlier had greater than 99% of their ^{137}Cs associated with non-exchangeable interlayer sites. The difference is attributed to the paucity in the South Carolina sediments of weathered micaceous clay minerals with their abundant interlayer sites. This suggests that ^{137}Cs will be physically and chemically more mobile in such areas as well as more biologically available. Mobility will be enhanced in regimes where cation inputs favoring ^{137}Cs exchange occur. Subsurface waste disposal sites where anaerobic conditions develop with NH^+_4 production and Fe^{+2} and Mn^{+2} release might be such a regime.

5204 Thermal Effluents Monitoring And Transport

10754 **(NZERDC—96) Environmental effects of cooling-water discharge into the ocean.** Grange, K.R. (Department of Scientific and Industrial Research, Wellington (New Zealand). Oceanographic Inst.). Sep 1983. 14p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84900575.

This report outlines the biological effects that may be caused by heated effluent from thermal power stations using seawater for cooling. Overseas literature on case studies is summarized with emphasis on predicting possible problems in New Zealand and how to minimize possible effects. Ecological surveys and monitoring studies undertaken in Manukau Harbour as baseline research for Auckland Thermal No. 1 and the subsequent combined-cycle power station sites are outlined, and recommendations for the design of future power stations in New Zealand attempted from the results of this research.

10755 **(TVA/ONR/WRF—83/20) Assessment of potential impact of the Clinch River Breeder Reactor Plant thermal effluent on the Watts Bar Reservoir striped bass population.** Heuer, J.H.; McIntosh, D.; Ostrowski, P.; Tomljanovich, D.A. (Tennessee Valley Authority, Knoxville (USA). Office of Natural Resources and Economic Development). Nov 1983. 16p. NTIS, PC A02/MF A01. Order Number DE84900615.

This report is an assessment of potential adverse impact to striped bass (Morone saxatilis) in Watts Bar Reservoir caused by thermal effluent from operation of the Clinch River Breeder Reactor Plant (CRBRP). The Clinch River arm of Watts Bar Reservoir is occupied by adult striped bass during the warmest months of the year. Concern was raised that operation of the CRBRP, specifically thermal discharges, could conflict with management of striped bass. In all cases examined the thermal plume becomes nearly imperceptible within a short distance from the discharge pipe (about 30 ft [10 m]) compared to river width (about 630 ft [190 m]). Under worst case conditions any presence of the plume in the main channel (opposite side of the river from the discharge) will be confined to the surface layer of the water. An ample portion of river cross sections containing ambient temperature water for passage or residence of adult striped bass will always be available in the vicinity of this thermal effluent. Although a small portion of river cross section would exceed the thermal tolerance of striped bass, the fish would naturally avoid this area and seek out adjacent cooler water. Therefore, it is concluded the CRBRP thermal effluent will not significantly affect the integrity of the striped bass thermal refuge in the Clinch River arm of Watts Bar Reservoir. At this time there is no need to consider alternative diffuser designs and thermal modeling. 8 references, 3 figures, 2 tables.

10756 **Gewaesserschutz - Wasser - Abwasser. (Investigations on the cooling of anthropogenically heated river water in special consideration of evaporation).** Ritter, K. Aachen, Germany, F.R.; Technische Hochschule (1981). 140p. (In German). Available from Gesellschaft zur Foederung der Siedlungswasserwirtschaft an der RWTH Aachen (Germany, F.R.).

The present work shall analyze by means of what methods exact temperature measurements can be performed in the running wave of rivers. Measurements in the nature shall prove if the cooling of heated river water can be calculated with sufficient accuracy by using the formulations for evaporation. If this does not hold true, a new formulation should be worked out on the basis of the measurements, and the differences in heat exchange between dead and running water should be shown.

5205 Site Resource And Use Studies

REFER ALSO TO CITATION(S) 9605, 9763

10757 (EIS—4900607) Draft environmental impact statement: proposed polymetallic sulfide minerals lease offering, Gorda Ridge area offshore Oregon and northern California. (Minerals Management Service, Reston, VA (USA). Headquarters Office). Dec 1983. 588p. Minerals Management Service, 12203 Sunrise Valley Dr., Reston, VA 22091.

The environmental impact statement (EIS) discusses a proposal to lease polymetallic sulfide minerals (PMS) in the Gorda Ridge area offshore of Oregon and northern California and considers alternatives to the proposal. Issues raised during the scoping process and issues raised through staff analysis have been addressed. In-place mitigation measures in the form of existing federal, state, and local laws are considered and additional potential mitigation measures that could be selected by the Secretary of the Interior are discussed. The probable impacts discussion addresses exploration for PMS minerals, mining, transportation to coastal bases of operation, beneficiation of the PMS ore, and transhipment to smelters or refineries. No quantitative assessment of resources is made rather than sufficient resources are presumed to exist to support the most likely case and full development case scenarios. Impacts on water quality, air quality, benthic and pelagic animals, and the socio-economic environment are considered. 357 references. (ACR)

5206 Regulations

REFER ALSO TO CITATION(S) 9991, 10028

53 ENVIRONMENTAL-SOCIAL ASPECTS OF ENERGY TECHNOLOGIES

5301 Social And Economic Studies

REFER ALSO TO CITATION(S) 9980, 10757

5302 Assessment Of Energy Technologies

REFER ALSO TO CITATION(S) 10037

10758 (CONF-8304143—1) Cultural resources and tradition: how computerized data contributes to environmental reviews. Curtis, S.A.; Levenson, J.B. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE84003681.

From 7. annual conference on contemporary American Indian issues; Los Angeles, CA, USA (15 Apr 1983).

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Mineral leasing and energy development on Indian reservations is the focus of much current activity. Such activities require environmental impact statements and well-designed development plans supported by data in a variety of formats. Rarely are the necessary documents prepared by tribal representatives, particularly those sections addressing the preservation and promotion of tribal traditions and cultural continuity. The purpose of this paper is to introduce a tool for rapid retrieval of spatial data required by tribal representatives for analysis of proposed mineral or energy development. Argonne National Laboratory has developed an interactive computerized mapping system that integrates several spatial environmental data bases: cultural and visual resources, ecological resources, settlement patterns, and demographics. The system provides easy access to, and manipulation of the data via a graphics CRT terminal that is linked to the Argonne computer. The system portrays the data in map form in relation to a proposed activity site. The operator is required to specify only the activity site coordinates, map scale, and the data theme to generate a map of potential constraint areas. Job turn-around is immediate since the system operates in real time. The operator also has the option to generate hardcopy maps, mylar overlays, and 35mm slides. Applied as a screening tool in preliminary phases of development, the system can map areas where potential conflicts exist as well as helping identify alternative areas where constraints are fewer. Alternatively, the system can be used to identify areas for which sufficient data are lacking for preparation of an EIS. Overall, the system has the potential for creating greater technical independence for tribes experiencing the pressures of mineral development. 3 references, 9 figures.

10759 Energy supply and demand implications of CO_2. Perry, A.M.; Araj, K.J.; Fulkerson, W.; Miller, M.M.; Rose, D.J. (Energy Division, Oak Ridge National Laboratory, Oak Ridge, TN). *Energy (Oxford);* 7: No. 12, 991-1003(Dec 1982). Contract W-7405-ENG-26.

It may become necessary to try to limit the concentration of atmospheric CO_2. Consideration of temperature rise as a surrogate for the ensemble of possible adverse effects of increased CO_2 suggests a concentration limit in the range of 1.5-2.5 times the present concentration (about 338 ppmv in 1980). Although the lower limit, even in the absence of restrictions on fossil fuel use, would probably not be reached for 50 years, that limit may nevertheless prove difficult to avoid because of long lead times required for major changes in energy demand and supply. The higher limit is not presently restrictive. In either case, intensive development of non-fossil energy sources appears warranted and improved efficiency of energy use will provide more time to make the transition.

10760 Risiken der Nutzenergiebereitstellung. (Risks of useful energy supply. Problems and consequences. Text volume). Hintz, R.A.; Flothmann, D.; Hartwig, S.; Heudorfer, W.; Schnatz, G. Frankfurt am Main, Germany, F.R.; Battelle-Institut e.V. (1980). 89p. (In German). Available from Fachinformationszentrum Energie, Physik, Mathematik, Karlsruhe (Germany, F.R.).

Alternatives of useful energy supply in the Federal Republic and their risks involved for the people occupied in the plants, the population and the eco-systems are discussed. The greatest risks for the workers are to be found in drift coal mining, for the population there is the risk of hardly ever occuring nuclear power plant accidents, the greatest risk for the eco-system is the worldwide increasing use of fossile fuel. A major long-term potential of oil substitution is offered by hard coal and nuclear energy provided the waste heat can be utilized as low-temperature heat for heating purposes. Energetic and economic heat transport is only possible for a distance of a few kilometres therefore heat must be generated near the place where it is needed and the size of heating power stations must be designed according to the population density. If the waste heat of nuclear power stations is to be used in the same way they would have to be located in densely populated areas and designed in such a way as to exclude grave failure consequences for the population. Underground power stations with smaller reactor cores are probably able to fulfill this demand and catastrophic failures caused by sabotage or war damage would be excluded. Economic and social problem of such a concept are brought to attention here.

55 BIOMEDICAL SCIENCES, BASIC STUDIES

REFER ALSO TO CITATION(S) 10000, 10001

5501 Behavioral Biology

10761 Specifying the nonspecific. Weiss, B. (Univ. of Rochester, NY). pp 71-86 of Application of behavioral pharmacology in toxicology. Zbinden, G. (ed.). New York, NY; Raven Press (1983). Contract AC02-76EV03490.

In behavioral pharmacology, schedule-controlled behavior has proved especially useful for distinguishing effects specific to one behavioral situation from effects reflecting a more general disruption of capacity. Toxicology requires not only characterization of effects, but also their detection at treatment or exposure levels at which other sources of variation can be eliminated. To achieve more specificity, both in hazard evaluation and risk estimation, behavioral toxicology should focus on identifying critical behavioral effects rather than on broad, superficial surveys. Microanalysis and

microcontrol strategies, sensitive instrumentation, multivariate analysis, and single-subject designs are some of the ways in which such specificity can be achieved.

10762 **The integration of multiple measures in behavioral toxicology.** Merigan, W.H. (The Environmental Health Sciences Center, Rochester, NY); Maurissen, J.P.J.; Barkdoll, E.; Eskin, T.A.; Lapham, L.W. pp 113-126 of Application of behavioral pharmacology in toxicology. Zbinden, G. (ed.). New York, NY; Raven Press (1983). Contract AC02-76EV03490.

Results of behavioral toxicology tests can fruitfully be compared to neurochemical, neuropathological, and neurophysiological data from the same animals. Neurochemical correlates of behavioral dysfunction can help pinpoint neuronal systems involved in behavioral change. In the present experiment, a wide range of behavioral, physiological, histological and other measures were collected from four primates during a toxicity study. We examined the effects of acrylamide, an agent that causes central-peripheral distal axonopathy. Integration of the measures described here provided a more complete insight into the nature of the neurobehavioral toxicity of acrylamide.

5502 Biochemistry

REFER ALSO TO CITATION(S) 10833, 10844

10763 **(CONF-821269—1) Control of molting in crustacea.** Skinner, D.M.; Graham, D.E.; Holland, C.A.; Mykles, D.L.; Soumoff, C.; Yamaoka, L.H. (Oak Ridge National Lab., TN (USA); National Institutes of Health, Bethesda, MD (USA); Massachusetts Inst. of Tech., Cambridge (USA); Duke Univ., Durham, NC (USA). Medical Center). 1982. Contract W-7405-ENG-26. 30p. NTIS, PC A03/MF A01. Order Number DE84004429.

From American Society of Zoologists conference; Louisville, KY, USA (27 Dec 1982).

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The single, overriding event that occurs during all proecdysial periods in crustaceans is the synthesis of a new exoskeleton that encompasses an enlarged animal when the old shell is cast off. Regeneration of missing appendages and larval or puberty metamorphoses also occur during proecdysis. Proecdysial periods have been divided into substages defined by the occurrence of specific events. Although a number of factors must be postulated to account for individual proecdysial events, only the molting hormone, 20-hydroxyecdysone, has been identified and isolated. Much evidence indicates that the X-organ sinus glands complex, a neurosecretory tissue located in the eyestalks, is the source of a molt inhibiting hormone (MIH) responsible for maintaining animals in anecdysis. An exuviation factor has been proposed to support the extrication of the animal from the old exoskeleton. There is evidence for a limb growth inhibitory factor (LGIF) that affects the rate of growth of regenerating limbs. We are proposing an anecdysial limb autotomy factor (LAF/sub an/) that propels into precocious molts anecdysial limb autotomy factor (LAF/sub pro/) that interrupts the proecdysial period of animals that lose one or more normal or partially regenerated pereopods before a critical time in proecdysis.

10764 **(CONF-831258—2) Mutagenic properties of O^6-methylguanine in DNA in vivo and in vitro.** Snow, E.T.; Foote, R.S.; Dodson, L.A.; Masker, W.; Mitra, S. (Oak Ridge National Lab., TN (USA); Tennessee Univ., Oak Ridge (USA). Graduate School of Biomedical Sciences). 1983. Contract W-7405-ENG-26. 24p. NTIS, PC A02/MF A01. Order Number DE84004576.

From 15. international congress of genetics, satellite symposium on mutagenesis: basic and applied; Darbhanga, India (22 Dec 1983).

Among the many basic alkylated sites produced in DNA by simple alkylating mutagens, O^6-alkylguanine is believed to be the major promutagenic lesion. Using O^6-methyl dGTP as a substrate during in vitro synthesis of biologically active T7 DNA we have shown that the incorporation of the alkylated nucleotide leads to increased reversion of an amber mutation in the phage DNA. We have shown that O^6-methylguanine has a strong preference for pairing with thymine over cytosine during in vitro replication of synthetic DNA templates with T4 and T5 phage DNA polymerases and E. coli DNA polymerase I. The degree of preference depends not only on the DNA polymerase used but possibly on other factors as well, including the divalent metal ion cofactors. The alkylated base in the template DNA also inhibits chain elongation of the product strand. While O^6-methyl dGTP can act as a substrate for DNA polymerases, as an analog of dATP, the alkylated nucleotide is incorporated only infrequently and inhibits overall DNA synthesis at the same time. A much higher turnover of the alkylated nucleotide than that of the normal nucleotides suggests that O^6-methylguanine is not recognized as a normal base by the DNA polymerases in spite of the fact that it is predicted to form a stable base pair with thymine.

10765 **(CONF-8208165—1) Resonance Raman spectra of photochemical picosecond transients: method and application to study bacteriorhodopsin primary processes.** El-Sayed, M.A.; Hsieh, C.L.; Nicol, M. (Technische Univ. Muenchen, Garching (Germany, F.R.). Inst. fuer Physikalische Chemie 1; California Univ., Los Angeles (USA). Dept. of Chemistry). 1982. Contract AT03-76ER70278. 14p. NTIS, PC A02/MF A01. Order Number DE84003707.

From International conference on time-resolved vibrational spectroscopy; Lake Placid, NY, USA (1 Aug 1982).

The use of lasers in determining the Raman and resonance Raman spectra of stable chemical and biological systems has produced many important and useful structural results over the past decade. The use of picosecond lasers and vidicon detection in Raman spectroscopy has greatly assisted in the development of resolved techniques. The high intensity of the laser made it possible to obtain Raman spectra with the laser frequencies within the absorption band of the substance studied. In the present work we present the resonance Raman spectra of bacteriorhodopsin transients in the 30 to 50 psec time scale of two vibrational regions of retinal, one (1100 to 1400 cm^{-1}, the fingerprint region) is sensitive to retinal conformational changes and the other ($\sim$ 1646 cm^{-1}) is of the protonated C=N stretching vibration of the Schiff base.

10766 **(DOE/ER/12003—4) Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1982-September 14, 1983.** Keyes, M.H. (Owens-Illinois, Inc., Toledo, OH (USA)). Dec 1983. Contract AC02-81ER12003. 22p. NTIS, PC A02/MF A01. Order Number DE84004090.

Two semisynthetic esterases, an acid-esterase with a pH optimum of 6.0 and a neutral-esterase with a pH optimum of 7.5, were generated from bovine pancreatic ribonuclease. The method involved perturbation of ribonuclease at pH 3.0, subsequent conformational modification with indole propionic acid, and crosslinking the modified protein with glutaraldehyde. The two esterases generated by this procedure were separated and partially purified by ammonium sulfate fractionation. The neutral-esterase activity was predominantly precipitated at 40% ammonium sulfate saturation, and the acid-esterase at 70 to 90% ammonium sulfate saturation. Nearly 4 fold purification of the esterases was achieved by this step. The two esterases were further purified by gel filtration of the above ammonium sulfate fractions on Biogel P0-30. Nearly 100 fold purification of the esterases over the starting modified RNase has been achieved by the above two purification steps. Kinetic studies with the purified acid-esterase indicated that this semisynthetic esterase hydrolyzed several aminoacid ethyl esters, but preferred ester containing an aromatic residue. The acid-esterase was competitively inhibited by L-tryptophan and also had low amidase activity towards benzoylarginine p-nitroanilide. Neutral-esterase showed a high degree of specificity toward L-TrEE and acetyl tryptophan ethyl ester. Moreover, this esterase had significant amidase activity toward N-acetyltryptophanamide (NATA). Neutral esterase was not inhibited by tryptophan.

10767 **(DOE/ET/00086—1) Characterization and isolation of a light driven sodium pump from membranes of Halobacterium halobium. Final technical progress report.** MacDonald, R.E. (Cornell Univ., Ithaca, NY (USA)). 1982. Contract FG02-79ET00086. 20p. NTIS, PC A02/MF A01. Order Number DE84005272.

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We investigated three aspects of the light driven sodium pump (halorhodopsin, which appear to be crucial to our understanding of the mechanisms employed by Halobacterium halobium and to further investigate this unique system of energy conservation. We characterized the molecular mechanisms of transmembrane sodium transport in vesicles from H. halobium with particular reference to the mechanism of couplins of light energy to net sodium translocation. We develop procedures and techniques for extracting the components of the light driven sodium pump from membranes and incorporating them into artificial membrane systems. We examine the mechanism of conversion of bacteriorhodopsin from an active to an inactive form in membrane vesicles and to relate this alternative state of this pigment to the presence of the light driven sodium pump.

10768 **(DOE/EV/04267—T1) Comparative mutagenesis of human cells in vitro and in vivo. Progress report and financial statement.** Thilly, W.G. (Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nutrition and Food Science). 1983. Contract AC02-77EV04267. 91p. NTIS, PC A05/MF A01. Order Number DE84005100.

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Our laboratory has undertaken the study of mutagenesis from two perspectives. First, we are devising methods to measure mutation in human beings and to recognize specific patterns of mutation indicative of exposures to particular environmental agents. Second, we are studying the basic question of how chemicals induce mutation and also their potential effects on gene regulation and expression. Specifically we report results which show the applicability of measuring mutation frequencies at small loci in a human lymphoblast cell line in the generation of mutational spectra. Our experiments in the area of gene regulation have revealed that 5-azacytidine can reverse the previously discovered effect of BUdR in inducing pseudomutation at the TK locus. In addition, we have developed an improvement in the performance of human lymphoblast mutation assays by devising means to measure plating efficiency at high cell densities.

10769 **(IAEA-RL—97) Report on intercomparison V-9 of the determination of trace elements in cotton cellulose.** Pszonicki, L.; Hanna, A.N.; Suschny, O. (International Atomic Energy Agency, Seibersdorf (Austria). Laboratories). Mar 1983. 105p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704122.

Trace elements in plants are being investigated in many laboratories using nuclear techniques, mainly neutron activation analysis. To enable these laboratories to check the accuracy of their work and to provide data needed in the certification of a batch of reference material, the IAEA has organized several intercomparisons of analytical results of plants. This report deals with the comparative evaluations of the results on cotton cellulose powder. A total of 27 laboratories from 19 countries submitted 377 laboratory means on 57 elements.

10770 **(IAEA-RL—98) Report on intercomparison A-13 of the determination of trace elements in freeze dried animal blood.** Pszonicki, L.; Hanna, A.N.; Suschny, O. (International Atomic Energy Agency, Seibersdorf (Austria). Laboratories). Mar 1983. 84p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704123.

This document deals with the comparative evaluation of the analytical data on the trace elements in beef blood obtained by 38 laboratories in 23 countries. The evaluations were based on 799 laboratory mean values of concentration of 41 elements. It was one of the series of IAEA intercomparisons on the determination of trace elements in animal materials. It was organized for the purpose of assisting the participating laboratories to check the accuracy of their work and to prepare a new reference material.

10771 **(LA-UR—83-3481) Comparison of remotely acquired deep-body and subdermal temperature measurements for detecting fever in cattle.** Seawright, G.L.; Brown, R.R.; Campbell, K.; Levings, R.L.; Araki, C.T. (Los Alamos National Lab., NM (USA); National Veterinary Services Labs., Ames, IA (USA); Hawaii Univ., Honolulu (USA). Dept. of Animal Science). 1983. Contract W-7405-ENG-36. 13p. (CONF-831254—1). NTIS, PC A02/MF A01. Order Number DE84004323.

From Agricultural electronics - 1983 and beyond conference; Chicago, IL, USA (11 Dec 1983).

Portions are illegible in microfiche products.

Results of two studies in which deep-body and subdermal temperatures were compared with fevers that were experimentally induced with viruses are given. In the first study, test animals were held indoors where ambient temperatures were stable; in the second study, animals were held outdoors during the winter months when temperatures were highly variable. A computerized temperature telemetry system used for the studies is described for the first time. (PSB)

10772 **(LBL—16901) Local structure of manganese in the photosynthetic apparatus and superoxide dismutase: an x-ray absorption study.** Goodin, D.B. (Lawrence Berkeley Lab., CA (USA)). Sep 1983. Contract AC03-76SF00098. 294p. NTIS, PC A13/MF A01. Order Number DE84004362.

Portions are illegible in microfiche products; Thesis.

The techniques of extended x-ray absorption fine structure (EXAFS), and x-ray absorption edge spectroscopy (XAES) are used to obtain specific structural information about the manganese coordination environment in synthetic inorganic complexes, and in biological redox systems. Analysis of EXAFS data is first used to obtain a structural assignment to manganese tetraphenylporphyrin complexes capable of alkane oxidation. We have applied EXAFS analysis to the manganese containing superoxide dismutases from various species to examine directly the similarities and differences in site structure between samples from distantly related organisms. These data are consistent with a structural model presented, in which the functional specificity of manganese and iron forms of SOD for their native metal can be explained on the basis of evolutionary relationships of their local ligand environments. A study of the manganese involvement in photosynthetic water oxidation by higher plants demonstrated that this process proceeds as though five intermediates, S_0-S_4, operate in a cyclic fashion. Finally, the release of manganese from photosynthetic membranes by inactivating treatments was studied using low temperature EPR. This work demonstrates the existence of bound forms of manganese which contribute significantly to the population of manganese centers that have been altered by inactivation. These studies are useful in defining roles for the various pools of manganese contained in photosynthetic membranes.

10773 **(UCRL—90106) Cytogenetic characterization of the CHO mutant EM9.** Dillehay, L.E.; Thompson, L.H.; Carrano, A.V. (Lawrence Livermore National Lab., CA (USA)). 12 Dec 1983. Contract W-7405-ENG-48. 11p. (CONF-831261—2). NTIS, PC A02/MF A01. Order Number DE84004820.

From International symposium on sister chromatic exchange; Upton, NY, USA (4 Dec 1983).

A remarkable property of the Chinese hamster ovary mutant EM9 is its very high baseline frequency of sister-chromatid exchange (SCE), about 110 per cell. EM9 is also hypersensitive (7-fold) to the induction of SCE by EMS. The high baseline SCE frequency in EM9 appears to be the result of a single mutational event. DNA replication in EM9 and AA8 was studied using pulse labeling and alkaline elution. After a 1 hour labeling period, the majority of the labeled DNA elutes rapidly indicating the small size of the nascent single-stranded molecules. In the absence of BradUrd substitution more than 50% of the labeled DNA is retained on the filter after a 1 hour chase.

10774 **Interaction of a DNA-binding protein, the gene product of D5 of bacteriophage T5, with double-stranded DNA.** Fujimura, R.K.; Roop, B.C. (Oak Ridge National Lab., TN). *Journal of Biological Chemistry;* **257**: No. 24, 14811-14816(25 Dec 1982). Contract W-7405-ENG-26.

Interaction of DNA and the gene product D5 (gpD5) of bacteriophage T5, a DNA-binding protein that binds preferentially and cooperatively to double-stranded DNA, were analyzed by metrizamide gradient centrifugation. Conditions were set so that DNA and DNA protein complex sedimented to apparent equilibrium positions. DNA has a buoyant density of 1.12 g/cm^3 and DNA saturated with gpD5 has a buoyant density of 1.17 g/cm^3. These values are independent of DNA size and base composition in the range studied. At gpD5 concentration below the saturation value in a low ionic strength buffer, DNA distribution is bimodal, indicating cooperative binding of gpD5 to DNA. However, in the presence of 10 mM $MgCl_2$, the binding process becomes distributive, with the buoyant density increasing linearly with the amount of gpD5 added until the saturation. From these data, one molecule of gpD5 is calculated to cover 40 base pairs at saturation. The technique as described has general applicability to the study of any interaction between DNA and DNA-binding proteins that bind in sufficient amount to cause detectable changes in buoyant density.

10775 **Purification and sequencing of cyanogen bromide fragments from ribulosebisphosphate carboxylase/oxygenase from Rhodospirillum rubrum.** Hartman, F.C. (Oak Ridge National Lab., TN); Stringer, C.D.; Omnaas, J.; Donnelly, M.I.; Fraij, B. *Archives of Biochemistry and Biophysics;* **219**: No. 2, 422-437(Dec 1982). Contract W-7405-ENG-26.

As a part of the goal to determine the total sequence of Rhodospirillum rubrum ribulosebisphosphate carboxylase/oxygenase, the cyanogen bromide fragments were fractionated and sequenced (or partially sequenced). Twelve of the anticipated 14 peptides were obtained in highly purified form. The other two peptides were located, respectively, within a tryptophanyl cleavage product (which overlapped with four CNBr fragments) and within an active-site peptide characterized earlier (which overlapped with three CNBr fragments). These overlaps coupled with amino and carboxyl terminal sequence information of the intact subunit and the availability of the sequence of the corresponding enzyme from higher plants permitted alignment of all fragments. Eight CNBr peptides were sequenced completely; four of the CNBr peptides consisted of more than 80 residues and were only partially sequenced as permitted by direct Edman degradation. Of the approximate 475 residues per subunit, 339 were placed in sequence. The lack of extensive conservation of primary structure between R. rubrum and higher plant carboxylases permits the tentative identifications of those regions likely to be functionally important.

10776 **An analysis of mRNAs for a group of heat shock proteins of soybean using cloned cDNAs.** Schoffl, F.; Key, J.L. *Journal of Molecular and Applied Genetics;* **1**: 301-314(1982). Contract AS09-80ER10678.

Hybridization studies carried out with poly(A)$^+$ RNA and its corresponding cDNA showed the presence of a new highly abundant RNA class after heat shock (hs) at 40°C in soybean hypocotyl compared to tissue incubated under normal conditions at 28°C. cDNA clones complementary to RNAs of this class were isolated; eleven clones were characterized and used in the analysis of these abundant RNAs. The most abundant hs-sequences were found to be 800-900 nucleotides in length and present in about 19,000 copies per cell. Extensive sequence homology among hs-induced RNAs was indicated by cross-hybridization of cDNA clones and by common protein patterns generated in hybrid release translations. The existence of at least two different nucleotide sequences common to several different hs-poly(A)$^+$ mRNAs was documented by different, nonoverlapping protein patterns obtained by in vitro synthesis with hybrid selected RNAs. Four clones contained a sequence common to mRNAs for a least 13 proteins of 15,000-18,000 daltons; another sequence common to mRNA for three to four proteins of 21,000-23,000 daltons was selected by one clone. Two other clones selected a major hs-protein of about 18,000 daltons. The mRNAs of these low molecular weight hs-proteins accumulated rapidly after induction at either 40°C or 42.5°C and decreased rapidly during subsequent incubation at 28°C.

10777 **Application of fluorescence and linear dichroism techniques to the characterization of the covalent adducts derived from interaction of (+/-)-trans-9,10-dihydroxy-anti-11,12-epoxy-9,10,11,12-tetrahydrobenzo[e]pyrene with DNA.** Gagliano, A.G. (Centre d'Etudes Nucleaires de Saclay, Cachan, France); Geacintov, N.E.; Ibanez, V.; Harvey, R.G.; Lee, H.M. *Carcinogenesis (New York);* **3**: No. 9, 969-976(1982). Contract AC02-78EV04959.

Spectroscopic techniques including absorption, fluorescence excitation and emission spectra, fluorescence decay profiles (determined by single photon counting techniques), and electric linear dichroism are applied to a study of the conformation of covalent adducts derived from a reaction of 9,10-dihydroxy-11,12-epoxy-9,10,11,12-tetrahydro[e]pyrene (B[e]PDE) with DNA. The characteristics of non-covalent adducts obtained from the intercalative binding of 9,10,11,12-tetrahydroxytetrahydrobenzo[e]pyrene (B[e]PT) (derived from the hydrolysis of B[e]PDE) with DNA are compared to those of the covalent B[e]PDE - DNA adducts. It is shown that there are two types of binding sites in B[e]PDE - DNA adducts: (1) an exterior binding site similar to the one observed with the isomeric 7,8-dihydroxy-9,10-epoxy-7,8,9,10-tetrahydrobenzo[a]pyrene (B[a]PDE) - DNA adducts, and (2) a quasi-intercalative type of binding site in which the properties of the pyrene chromophore are similar to those of an intercalated pyrene moiety, but in which the red shift in the absorption maximum, and fluorescence quenching are less pronounced. This latter conformation is not observed in covalent B[a]PDE - DNA adducts. It is shown that the DNA concentration is an important parameter in determining the relative number of pyrene chromophores at these two binding sites. The extent of covalent binding of B[e]PDE is 4 - 8 times less than the binding of B[a]PDE to DNA under the same experimental conditions. The reduced reactivity of B[e]PDE is tentatively attributed to steric hindrance due to quasi-diaxial conformations of the two hydroxyl groups in one of the two bay-regions of B[e]PDE.

10778 **Spectroscopic characterizations and comparisons of the structures of the covalent adducts derived from the reactions 7,8-dihydroxy-7,8,9,10-tetrahydrobenzo[a]pyrene and 9,10,11,12-tetrahydrobenzo[e]pyrene with DNA.** Geacintov, N.E. (New York Univ., New York); Gagliano, A.G.; Ibanez, V.; Harvey, R.G. *Carcinogenesis (New York);* **3**: No. 3, 247-253(1982). Contract AC02-78EV04959.

The conformation of covalent adducts derived from the reactions of racemic 7β,8α-dihydroxy-9α,10α-epoxy-7,8,9,10-tetrahydrobenzo[a]pyrene (BaPDE), 9,10-epoxy-7,8,9,10-tetrahydrobenzo[a]pyrene (BaPE), and 9,10-epoxy-9,10,11,12-tetrahydrobenzo[e]pyrene (BePE) with calf thymus DNA in aqueous buffer solution (25°C, pH 7.0) were investigated and compared by means of absorption, fluorescence and electric linear dichroism techniques. Two types of conformations are recognized. Site I is characterized by a red shift (~10 nm) in the absorption maximum of the pyrene nucleus, a significantly reduced fluorescence yield, and a negative electric linear dichroism signal (ΔA); this site is presumed to involve a near-parallel (within 25°) orientation of the planar pyrene residue with the planes of the DNA bases, and a relatively strong interaction between the π electrons of the nucleic acid bases and the pyrene residue. In site II, there is only a small red-shift in the absorption maximum (~2 nm), a non-zero fluorescence yield, and a positive ΔA throughout the absorption region of the pyrene residue; in this conformation the pyrene residue is presumed to lie on the outside of the DNA molecule, possibly in one of the grooves. The BaPDE - DNA complex displays predominantly a site II-type conformation while the BaPE - and BePE - DNA complexes display both site I and site II adducts, with site I conformations predominating. The lack of hydroxyl groups in BaPE and BePE lead to a loss in stereospecificity in covalent adduct formation. The 7 and 8 hydroxyl groups in BaPDE appear to reduce the probability of formation of site I-type covalent adducts, and appear to be, at least in part, responsible for the enantiomeric stereospecificity in the covalent reaction between BaPDE and DNA.

10779 Regulation by turnover of Na,K-ATPase in HeLa cells. Pollack, L.R. (Albert Einstein School of Medicine, Bronx, NY); Tate, E.H.; Cook, J.S. pp 71-87 of Membranes in growth and development. New York, NY; Alan R. Liss, Inc. (1982). Contract W-7405-ENG-26.

HeLa Na,K-ATPase is an essential enzyme of the cell surface. The three ways in which it is regulated may be summarized as follows: 1) The activity of the enzyme under normal conditions responds almost linearly to small perturbations in internal (Na^+); this is short-term regulation. 2) In the normal steady state, the enzyme is one of the rapidly turning over components of the cell surface; this is part of long-term regulation. The functional importance of turnover to cell homeostasis depends on the reversibility of any event that may inactivate the enzyme. Thus turnover is an important, but not the only, means of recovery from ouabain intoxication, and for an inactivating ligand that dissociates more readily than ouabain turnover may be relatively unimportant. Conversely, turnover may be the only means of recovery from thermal inactivation at physiological temperatures. 3) Under conditions of prolonged stress, turnover itself may be modulated so as to enhance the number of active enzymes on the cell surface. Regulation by turnover has the advantage of permitting a prompt response to a changing cell environment, whereas regulation by synthesis would introduce a delay in response at least equal to the transit time. It has been suggested that the signal for the increase in Na,K-ATPase is elevated cellular (Na^+), but how this is translated into a mechanism for altering the specific clearance of this enzyme from the membrane is not known. (JMT)

10780 Probing the microenvironment of benzo[a]pyrene diol epoxide-DNA adducts by triple excited state quenching methods. Poulos, A.T.; Kuzmin, V.; Geacintov, N.E. (New York Univ., New York). *Journal of Biochemical and Biophysical Methods;* **6**: 269-281(1982). Contract AC02-78EV04959.

Triplet flash photolysis techniques, coupled with quenching of the triplets by molecular oxygen, are utilized as probes of the microenvironment of polycyclic aromatic molecules bound covalently and non-covalently to DNA. The triple-oxygen quenching properties of the following adducts in aqueous solutions at 25 +/- 1°C were investigated: covalent adducts derived from the reaction of (+/-)-7β,8α-dihydroxy-9α,10α-epoxy-7,8,9,10-tetrahydrobenzo[a]pyrene (BaPDE) and of (+/-)-9,10-epoxy-7,8,9,10-tetrahydrobenzo[a]pyrene (BaPE) with DNA, and non-covalent intercalation complexes of acridine orange (AO) and DNA. In all cases the quenching follows the Stern-Volmer quenching law with a quenching constant of K/sup T//sub O_2/ $\approx 10^9$ $M^{-1}.s^{-1}$ for the covalent BaPDE-DNA and BaPE-DNA complexes in aqueous solution. This value of K/sup T//sub O_2/ is characteristic of free molecules (not bound to DNA) and indicates that the pyrene chromophore is totally accessible to oxygen, and is thus not located at an intercalation-type of binding site in these covalent adducts. In contrast, the AO-DNA complexes are characterized by values of K/sup T//sub O_2/ $\approx 10^8$ $M^{-1}.s^{-1}$ indicating that the intercalated AO molecules are about ten times less accessible to molecular oxygen than free AO molecules. The K/sup T//sub O_2/ values for the covalent BaPDE-DNA and BaPE-DNA adducts decrease when the DNA concentration is increased in the 1×10^{-4} - 3×10^{-3} M range (expressed in nucleotide concentration). This effect is attributed to intermolecular DNA-DNA interactions in which segments of adjacent DNA molecules tend to cover the pyrene chromophores on other strands, thus decreasing their accessibility to oxygen. In contrast the values of K/sup T//sub O_2/ for the non-covalent AO-DNA intercalation complexes are independent of DNa concentration, as expected for interior binding sites.

10781 Characterization of two uterine proteases and their actions on the estrogen receptor. Gregory, M.R.; Notides, A.C. (Univ. of Rochester School of Medicine and Dentistry, NY). *Biochemistry;* **21**: No. 25, 6452-6458(1982). Contract AC02-76EV03490.

We have characterized two previously undetected proteases from the calf uterine cytosol and measured their actions on the estrogen receptor. One is an exopeptidase, purified 60-fold, that hydrolyzed amino acid (lysine-, and alanine-, or leucine-) p-nitroanilide substrates and leucyl-glycylglycine, did not hydrolyze [^{14}C]methemoglobin, was completely inhibited by 1 mM bestatin or puromycin (specific inhibitors of leucine aminopeptidase like enzymes), and was unable to influence the sedimentation of the 8S form of the estrogen receptor in sucrose gradients containing dilute Tris buffer. A commercial porcine leucine aminopeptidase, like the calf uterine aminopeptidase, did not convert the 8S estrogen receptor to a 4S form. Evidently, removal of the N-terminal amino acid(s) from the estrogen receptor by exopeptidase action cannot alter the sedimentation of the 8S form of the receptor, or the N-terminal amino acid(s) of the receptor is (are) unaccessible or resistant to exopeptidase activity. The second, a receptor-active protease, is an endopeptidase that did not hydrolyze any of the synthetic amide or peptide substrates tested but did possess [^{14}C]methemoglobin-degrading activity and the ability to convert the 8S estrogen receptor to a modified 4S form in sucrose gradients containing dilute Tris buffer. The modified 4S receptor was separable from the native receptor by DEAE-cellulose chromatography. The endopeptidase did not require Ca^{2+} for activity, and its chromatographic properties were distinctly different from a previously isolated Ca^{2+}-activated protease. It was inhibited by leupeptin or dipyridyl disulfide, suggesting the presence of a thiol group that is essential for its activity.

10782 Paths of carbon and their regulation. Bassham, J.A. (Lawrence Berkeley Lab., CA). pp 117-130 of On the origins of chloroplasts. Schiff, J.A. (ed.). Amsterdam, Netherlands; Elsevier North Holland, Incorporated (1982). Contract W-7405-ENG-48.

Two questions arise when one considers the paths of carbon and their regulation with respect to the objectives of the conference on which this book is based. First, one might hope to gain some clues regarding the possible evolutionary relationships between bacteria carrying-out oxygenic photosynthesis and chloroplasts from eukaryotic cells, from a comparison of carbon pathways and their regulation. Second, one might attempt to write a scenario for the evolution of the carbon pathways from the most primitive of these organisms onward.

5503 Cytology

REFER ALSO TO CITATION(S) 10829

10783 (BNL—33857) Role of DNA polymerase α in chromosomal aberration production by ionizing radiation. Bender, M.A. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 20p. (CONF-8310231—2). NTIS, PC A02/MF A01. Order Number DE84002862.

From International conference on hematopoietic cellular proliferation; Upton, NY, USA (6 Oct 1983).

Aphidicolin is a tetracyclic diterpinoid fungal antibiotic which inhibits DNA synthesis in eukaryotic cells by interfering specifically with DNA polymerase α, apparently by binding to and inactivating the DNA-polymerase α complex. We have shown that aphidicolin, like other inhibitors of DNA synthesis, both induces chromosomal aberrations in human peripheral lymphocytes, and, as a post-treatment, interacts synergistically with x rays to produce greatly enhanced aberration yields. The present experiments explore the effects of aphidicolin in human lymphocytes in the post-DNA-synthetic G_2 phase of the cell cycle. These experiments utilized labeling with tritiated thymidine to positively identify cells in the S phase at the time of treatment, and used serial colcemid collections and fixations to determine aberration yields over as much of the G_2 phase as feasible. Because DNA polymerase α is the only DNA synthetic or repair enzyme known to be affected by aphidicolin, we infer that this enzyme is directly involved in the repair of DNA lesions which can result in visible chromosomal aberrations. (DT)

10784 (INIS-mf—8276) Studies of cell kinetics in vital and necrotic tumor regions: Measurement of loss rate using ^{125}iododeoxyuridine. Porschen, R. (Duesseldorf Univ. (Germany, F.R.). Medizinische Fakultaet). 1981. 145p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704751.

The method of determining cell losses in situ from the decrease in radioactivity after a single i.p. injection of the thymidine-analogue, ^{125}iododeoxyuridine was tested for its applicability in different development stages of the solid mammary adenocarcinoma EO 771 on male C57 N1/6J mice. Invasive studies on activity distributions in vital and necrotic tumour regions were carried out after injection of Light Green SF. The following results were obtained: 1) External measurement of activity loss register the removal of labelled cells and decay products rather than cell death. The total activity of the tumour at any time following injection corresponds to the sum of radioactivity in the proliferating, non-growing and necrotic compartments. 2) In solid tumours, there are regions with differing transport capacity. 3) The method using ^{125}J-UdR does not allow determination of loss rates as a function of a given volume but rather yields an averaged value. 4) Activity losses of vital tumour cells largely correspond to the cell loss. (orig./MG).

10785 **Measurement of repair patch size by quantitation of nucleotides excised during DNA repair in vivo.** Radany, E.H.; Friedberg, E.C. (Stanford Univ., CA). *Journal of Virology;* **47**: No. 2, 367-369(Aug 1983). Contract AT03-76EV70032.

Escherichia coli uvr$^-$ cells, prelabeled in their DNA, were infected with phage T4 denV$^+$ or T4 denV$^-$ under conditions that preclude phage-mediated degradation of the bacterial chromosome. Measurement of the distribution of acid-soluble radioactivity between pyrimidine dimers and nondimer nucleotides in cell extracts yielded calculated estimates of the average size of excision repair tracts that are in good agreement with the size of repair patches determined by others using direct measurement of repair synthesis.

10786 **Synaptonemal complex analysis of X-7 translocations in male mice.** Ashley, T. (Univ. of Tennessee, Knoxville); Russell, L.B.; Cacheiro, N.L.A. *Chromosoma;* **87**: 149-164(1982). Contract W-7405-ENG-26.

The synaptonemal complexes of surface-spread spermatocytes of mice heterozygous for one of two reciprocal translations (R3 and R5) between the X and chromosome 7 have been examined by light and electron microscopy (EM). The break points of R3 were determined to be at 70% of chromosome 7, as measured from the centromere, and at 22% of the X. Translocation quadrivalents were formed almost exclusively. The break points of R5 were at 21% of chromosome 7 as measured from the centromere, and at 83% of the X. There was little indication that the break in the X interfered with sex-chromosome synapis between the 7X and Y. Univalent Y's were not observed in R3, and only seldom observed (8-14%) in R5. However, in contrast to R3, R5 formed quadrivalents relatively rarely (20% in the EM study of 100 nuclei), and hetermorphic bivalents of 7X-Y and X7-7 quite frequently (72%). Possible causes of this high bivalent frequency are discussed. Light-microsope (LM) analysis alone was found to be inadequate for interpreting synaptic configurations (quadrivalents vs. bivalents) in R5. The LM analysis was further complicated by the occurrence of nonhomologous synapsis in the heteromorphic bivalents of R5, a phenomonon easily recognized and interpreted in the EM portion of the study.

10787 **Rapid, one step staining procedures for analysis of cellular DNA and protein by single and dual laser flow cytometry.** Crissman, H.A.; Steinkamp, J.A. (Los Alamos National Lab., NM). *Cytometry (Baltimore);* **3**: No. 2, 84-90(1982).

Detailed, simplified techniques are described for simultaneous staining and analysis of DNA and protein in a number of mammalian cell types. Cell staining involves the addition of appropriate dye mixtures to unfixed or ethanol-fixed cells and subsequent analysis of cell populations in the staining reagents generally within 10 to 20 minutes. The approach is novel in that no centrifugation steps are involved during the staining procedure, thus, eliminating cell clumping and cell loss and making the procedures appropriate for samples containing limited numbers of cells. For single wavelength analysis, staining of DNA and protein in ethanol-fixed cells was accomplished with a dye solution containing propidium iodide, fluorescein isothimocyanate and RNase. After 20 minutes at room temperature cells were analyzed using the 488 nanometer (nm) laser excitation line. For dual laser analysis the following dye combinations were employed without RNase: mithramycin-rhodamine 640, mithramycin-substituted rhodamine isothiocyanate, Hoechst 33342-rhodamine 640 and Hoechst 33342-rhodamine isothiocyanate. Unfixed cells were also stained with the Hoechst 33342-rhodamine 640 dye combination. Mithramycin was excited at 457.9 nm, Hoechst 33342 at 333-363 nm, and rhodamine dyes at 568 nm. Cell types analyzed included Chinese hamster ovary cells, cultured mouse colon 26 cells, mouse embryo forelimb bud cells, and rat cell obtained by lung lavage.

5504 Genetics

REFER ALSO TO CITATION(S) 10773, 10774, 10895, 10912

10788 **Interspecific plasmid transfer between Streptococcus pneumoniae and Bacillus subtilis.** Espinosa, M. (Inst. de Immunologia y Biologia Microbiana, Velazquez, Madrid, Spain); Lopez, P.; Perez-Urena, M.T.; Lacks, S.A. *Molecular and General Genetics;* **188**: 195-201(1982).

The streptococcal plasmids pMV158 and pLS1, grown in Streptococcus pneumoniae, were transformed to Bacillus subtilis by DNA-mediated transformation.The plasmids were unchanged in the new host; no deletions were observed in 80 instances of transfer. Hybrid plasmids were produced by recombining the EcoRI fragment of pBD6 that confers Km/sup r/ with EcoRI-cut pLS1, which confers Tc/sup r/. The simple hybrid, pMP2, was transferable to both species and expressed Tc/sup r/ and Km/sup r/ in both. A derivative, pMP5, which contained an insertion in the pBD6 component, expressed a higher level of kanomycin resistance and was more easily selected in S. pneumoniae. Another derivative, pMP3, which contained an additional EcoRI fragment, presumably of pneumococcal chromosomal DNA, could not be transferred to B. subtilis. Previous findings that monomeric plasmid forms could transform S. pneumoniae but not B. subtilis were confirmed using single plasmid preparations. Although plasmids extracted from either species were readily transferred to S. pneumoniae, successive passage in B. subtilis increased the ability of plasmid extracts to transfer the plasmid to a B. subtilis recipient. This adaptation was tentatively ascribed to an enrichment of multimeric forms in extracts of B. subtilis as compared to S. pneumoniae. A review of host ranges exhibited by plasmids of Gram-positive bacteria suggested differences in their ability to use particular host replication functions. (JMT)

10789 **How does the extracellular matrix direct gene expression?.** Bissell, M.J.; Hall, H.G.; Parry, G. (Univ. of California, Berkeley). *Journal of Theoretical Biology;* **99**: 31-68(1982). Contract AC03-76SF00098.

Based on the existing literature, a model is presented that postulates a "dynamic reciprocity" between the extracellular matrix (ECM) on the one hand and the cytoskeleton and the nuclear matrix on the other hand. The ECM is postulated to exert physical and chemical influences on the geometry and the biochemistry of the cell via transmembrane receptors so as to alter the pattern of gene expression by changing the association of the cytoskeleton with mRNA and the interaction of the chromatin with the nuclear matrix. This, in turn, would affect the ECM, which would affect the cell.

10790 **Nucleotide sequence of DNA controlling expression of genes for maltosaccharide utilization in Streptococcus pneumoniae.** Stassi, D.L.; Dunn, J.J.; Lacks, S.A. (Brookhaven National Lab., Upton, NY). *Gene;* **20**: 359-366(1982).

An analysis of previous data indicated that four structural genes concerned with maltosaccharide utilization in Streptococcus pneumoniae are organized in two operons that are transcribed in opposite directions from a central control region. This region contains two strong promoters subject to repression by a regulatory gene product in the absence of maltose. The nucleotide sequence of the 554-bp control region DNA and adjacent portions of the malX and malM structural genes was determined. Unique reading frames and initiation codons allowed identification of the oppositely oriented structural genes. Putative ribosome binding sites and -10 and -35 RNA-polymerase-binding sites, as well as AT-rich regions farther upstream, were observed proximal to both the X and M genes. The

similarity of these sequences to sites found in Escherichia coli and Bacillus subtilis indicated the conservation of control signals in bacteria, both Gram-negative and Gram-positive. A pair of 17-bp hyphenated repeat sequences in the control regions may represent repressor binding sites. Two down promoter mutations, V11 and 69, were shown to be deletions in the control region. The V11 mutation, which affected only the MP operon, deleted the promoter adjacent to the M gene. Mutation 69, which reduced both X and M gene functions, deleted the entire segment between the promoters so that they now overlap at their -35 binding sites. As a consequence of this deletion, the AT-rich regions proximal to the promoters were lost. This suggest that the AT-rich regions are important for promoter strength.

5505 Metabolism

REFER ALSO TO CITATION(S) 9607, 10768, 10935, 10944

10791 (SLU-REK—53) Root bioactivity of corn and sunflower as evaluated by ^{75}Se-plant injection technique. Haak, E.; Paltineanu, I.C. (Swedish Univ. of Agricultural Sciences, Uppsala. Dept. of Radioecology). 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704540.

A tracer technique was used for root studies under field conditions on a chernozemic soil in Romania. ^{75}Se was injected at the stem base and radioassayed for its presence in soil profiles with a gammasond lowered to different depths. Based on the assumption that ^{75}Se is preferably transferred within the root system to active root tissue of injected plants, the root bioactivity was estimated for corn at the knee high stage and just before tasseling, and for sunflower at early maturing, the crops being subjected to different N-fertilization and irigation treatments. The pattern of root bioactivity varied with crop, time and treatment applied. The technique, which is briefly described, seems to be a promising tool for delineation of root response to variation with depth in the soil profile of moisture and nutrient status and as shown in this pilot investigation for delineation of effects of irrigation and N-fertilization.

10792 (SLU-REK—54) Aspects on the use of isotopes in studies of biological dinitrogen fixation by legumes. Haak, E. (Swedish Univ. of Agricultural Sciences, Uppsala. Dept. of Radioecology). 1983. 16p. (CONF-8008170—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704320.

From Conference on isotope techniques in studies of the usual conservation and the pollutant potential of agricultural nitrogen residues; Vienna, Austria (25 Aug 1980).

Techniques used for estimation of N_2-fixation by legumes are briefly reviewed. As judged from the literature, acetylene reducing techniques are suitable for assessment of instantaneous N_2-fixation techniques in laboratory and greenhouse tests while isotope techniques are suitable for assessment of integrated N_2-fixation in field tests. In a field test ^{15}N-enriched calcium nitrate was applied at seeding in a microplot experiment with two pea varieties and one oat variety, the latter used as reference crop. Yield independent criteria were used to calculate the fractional uptake of nitrogen in the plant, derived from soil-N, fertilizer-N and in the pea varieties also from N_2-fixation, and to calculate the A-values expressing the available amounts in soil of native nitrogen and of nitrogen obtained by N_2-fixation. The figures of fractional uptake were combined with N-yields for supplemental field plots for calculation of the absolute uptake of nitrogen from the three sources concerned and of recoveries of applied fertilizer-N. It was concluded that if certain precautions are taken to ensure acceptable isotopic dilution conditions, the potential of the method tested is obvious.

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REFER ALSO TO CITATION(S) 10388, 10540, 10740, 10909, 10911, 10927, 11157, 11179

10793 (CEA-CONF—6549) Use of a model for the determination of actual lung volume in hypoxemic patients. Delforge, Jacques. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Oct 1982. 19p. (In French). (CONF-8210193—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704330.

From Workshop on theoretical biology and medicine; Angers, France (11 Oct 1982).

Two models using the transformation systems formulation were set up for the precise determination of actual lung volume in hypoxemic patients. The first model, for a study of the lungs as a whole, contains two experimental identification categories and three equivalence classes. The second, for the study of a particular lung region, possesses three categories and five classes. The parameters of these models are shown to be easily identified by the use of all available experimental data, including the clearance curves. It is found that the two whole-lung study equivalence classes appear also in the study of each part of the lung, which shows that their biological meaning is to be found locally (probably at the level of each air-cell) and does not therefore correspond to differences in behaviour from one part of the lung to another.

10794 (GKSS—83/E/18) Fast neutron imaging by cellulose nitrate foils. Duehmke, E.; Greim, L. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1983. 7p. Neutron Radiography, J.P. Barton, P. von der Hardt (eds.), (1983) p. 565-571.

Fast neutrons show sufficient penetration to test thick hydrogen containing objects. Neutron radiography can be done by track etch foil methods, which detects recoil nuclei especially protons. The imaging process has been studied in respect to optimal etching conditions, sensitivity and dose-density relations. A multifoil imaging system is proposed, which allows to lower the necessary neutron dose, supresses artifacts and expands the attainable density range. With this system a good sharpness can be achieved; this has also been shown by comparison of the modulation transfer function with those of different X-ray imaging systems.

10795 (GKSS—83/E/19) Fast neutron radiography in biology and medicine. Duehmke, E.; Greim, L. (GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)). 1983. 8p. Neutron Radiography, J.P. Barton, P. von der Hardt (eds.) (1983) p. 573-580.

Fast neutrons are necessary for neutron radiography of extended biological objects. Applying cellulose nitrate foils to assure specific neutrograms undisturbed by X-ray and γ-ray effects, a multifoil stack can be used as detector in order to improve image quality and to reduce neutron dose down to less than 10 rem. Neutron radiography enables to observe the exsiccation process in biological materials, e.g. wood, which could not be achieved by X-ray radiography. In medicine neutron radiography could be of value for detecting pathological changes within bone such as replacement of bone narrow by fat or tumor, as shown in human vertebral columns.

10796 (IAEA-TECDOC—281) Use and maintenance of nuclear medicine instruments in Southeast Asia. Results of a survey conducted by the Medical Applications Section of the IAEA. (International Atomic Energy Agency, Vienna (Austria)). Feb 1983. 70p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704185.

Nuclear medicine instruments are rather sophisticated. They are difficult to maintain in effective working condition, especially in developing countries. The present document describes a survey conducted in Bangladesh, India, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka and Thailand from October 1977 to March 1978, on the use and maintenance of nuclear medicine equipment. The survey evaluated the existing problems of instrument maintenance in the 8 countries visited. The major instruments in use were (1) scintillation probe counters, (2) well scintillation counters and

(3) rectilinear cameras. Gamma camera was not widely available in the region at the time of the survey. Most of the surveyed instruments were kept in a detrimental environment resulting in a high failure rate, that caused the relatively high instrument unavailability of 11%. Insufficient bureaucratic handling of repair cases, difficulties with the supply of spare- and replacement parts and lack of training proved to be the main reasons for long periods of instrument inoperation. Remedial actions, based on the survey data, have been initiated.

10797 **(INIS-mf—8640) Transverse tomography and radiotherapy. The use of computer tomography and transverse analog tomography for radiotherapy treatment planning.** Leer, J.W.H. (Rijksuniversiteit Leiden (Netherlands)). 9 Jun 1982. 103p. (In Dutch). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704758.

This study was intended to delineate the indications for radiotherapy treatment-planning with the help of computerized axial tomography (C.T.) and transverse analog tomography (T.A.T.). Radiotherapy localisation procedures with the conventional method (simulator), with the CT-scanner and with the transverse analog tomograph (T.A.T., Simtomix, Oldelft) were compared. As criterium for evaluation differences in reconstruction drawing based on these methods were used. A certain method was judged "superior" to another if the delineation of the target volume was more accurate, if a better impression was gained of the site of (for irradiation) organs at risk, or if the localisation could only be performed with that method. The selected group of patients consisted of 120 patients for whom a reconstruction drawing in the transverse plane was made according to the treatment philosophy. In this group CT-assisted localisation was judged on 68 occasions superior to the conventional method. In a number of cases it was found that a "standard" change in a standard target volume, on the base of augmented anatomical knowledge, made the conventional method sufficient. The use of CT-scanner for treatment planning was estimated. For ca. 270/1000 new patients a CT-scan is helpful (diagnostic scan), for 140 of them the scan is necessary (planning scan). The quality of the anatomical information obtained with the T.A.T. does not yet fall within acceptable limits, but progress has been made.

10798 **(INIS-mf—8644) Diagnosis of multiple sclerosis.** Sanders, E.A.C.M. (Rijksuniversiteit Leiden (Netherlands)). 3 Jun 1982. 278p. (In Dutch). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83704756.

This thesis describes recently developed research methods for the diagnosis of multiple sclerosis. In Chapter X the use of the CT-scan in the detection of hemispheral or cerebellar lesions is discussed. In chapter XIII the results of the application of all methods to a group of 89 patients with definite, probable or possible multiple sclerosis and to a group of 25 purely optic neuritis patients are presented. With the aid of the CT-scan, hypo- or hyperdense areas in the white matter of the cerebral hemispheres were found in 52% of the 114 patients. Most reports ascribe these lesions to demyelinating cerebral plaques. The CT-scan showed no cerebellar or brainstem lesions. The CT-scan is independent of the duration of, and degree of incapacitation due to, the disease and can be helpful in giving a definite diagnosis in an early stage of the disease. The CT-scan will always play an important role for the differential diagnosis.

10799 **(INIS-mf—8645) Nuclear cardiology. Fourier functional images in left ventricular wall motion analysis and an investigation into lesion detectability in myocardial perfusion scintigraphy.** Vos, P.H. (Rijksuniversiteit Leiden (Netherlands)). 3 Jun 1982. 128p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704757.

This thesis deals with two topics in nuclear cardiology. In the first, left ventricular wall motion assessment using Fourier transform of local left ventricular time-activity curves in gated blood pool studies is evaluated. In the second, the interpretation of myocardial perfusion scintigrams is assessed which are obtained with thallium-201 or with another radiopharmaceutical with different physical, but identical biological properties. In all these investigations data acquisition and analysis by computer played an essential role. In chapter 1 the desirable properties of a nuclear medicine computer system are given and the computer system used for this work is described. Wall motion analysis of the left ventricle using Fourier transform of local time-activity curves in the left ventricular region in gated blood pool studies is described in chapter 2. In chapter 3 detection of non-perfused lesions in myocardial perfusion scintigraphy with thallium-201 is described. Detection of partly perfused lesions and the influence of scatter and photon energy on myocardial perfusion scintigraphy is described in chapter 4.

10800 **(INIS-mf—8646) Fibrosarcoma of bone. A clinical-radiological investigation.** Taconis, W.K. (Rijksuniversiteit Leiden (Netherlands)). 16 Jun 1982. 178p. (In Dutch). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83704759.

A general clinical-radiological description of fibrosarcoma of bone, including tumours with features of malignant fibrous histiocytoma is presented. 104 patients with fibrosarcoma of the long bones are analysed in terms of age and sex distribution, symptoms, duration of symptoms and tumour localization. The radiological findings obtained in patients with fibrosarcoma of the long bones are discussed. The treatment and course of fibrosarcoma of the long bones are discussed. Data on the type of therapy given were available on 103 patients: 67 were treated by ablative surgery either immediately or within three months of preceding local surgery and/or radiotherapy. In the remaining 36 cases treatment consisted of local surgery, radiotherapy or a combination of these, or non-curative (palliative) treatment. In a few cases ablative surgery was performed at a later stage. 13 patients with fibrosarcoma of the axial skeleton and 14 with fibrosarcoma of the jaws are considered. A causistic discussion of patients with a secondary fibrosarcoma is presented. Secondary fibrosarcoma was found in a total of 19 patients (14%); 4 after irradiation. The features of significance for the course of the disease are discussed: general features such as age and sex, tumour localization in the long bones, presence or absence of a pathological fracture, and the radiological and histological characteristics of the tumour. The type of therapy and the occurrence of lung metastases in relation to the course of the disease is also discussed.

10801 **(INIS-mf—8647) Angiography of the upper extremity.** Janevski, B.K. (Rijksuniversiteit Leiden (Netherlands)). 1982. 238p. NTIS (US Sales Only), PC A15/MF A01. Order Number DE83704760.

This thesis provides a description of the technical and medical aspects of arteriography of the upper extremity and an extensive analysis of the angiographic anatomy and pathology of 750 selective studies performed in more than 500 patients. A short historical review is provided of angiography as a whole and of arteriography of the hand in particular. The method of percutaneous transfemoral catheterization of the arteries of the upper extremity and particularly the arteries of the hand is considered, discussing the problems the angiographer encounters frequently, describing the angiographic complications which may occur and emphasizing the measures to keep them to a minimum. The use of vasodilators in hand angiography is discussed. A short description of the embryological patterns persisting in the arteries of the arm is included in order to understand the congenital variations of the arteries of the upper extremity. The angiographic patterns and clinical aspects of the most common pathological processes involving the arteries of the upper extremities are presented. Special attention is paid to the correlation between angiography and pathology.

10802 **(INIS-mf—8650) Monoclonal antibodies to Herpes Simplex Virus Type 2.** McLean-Pieper, C.S. (Landbouwhogeschool Wageningen (Netherlands)). 3 Sep 1982. 86p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704750.

In this thesis the production and characterisation of monoclonal antibodies to Herpes Simplex Virus Type 2 is described. The development of a suitable radioimmunoassay for the detection of anti-HSV-2 antibodies, and the selection of an optimal immunisation schedule, is given. Three assay systems are described and their reliability and sensitivity compared.

10803 **(LUMEDW/MEOC—1014/01-71(1983)) Femoral head vitality after intracapsular hip fracture. 490 cases studied by intravital tetracyclic labeling and Tc-MDP radionuclide scintimetry.** Stroemqvist, B. (Lund Univ. (Sweden). Dept. of Orthopaedics). May 1983. 71p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704558.

Femoral head vitality before, during and at various intervals from the operation was determined by tetracycline labeling and/or ^{99} sp (m)Tc-MDP scintimetry. In a three-year follow-up, healing prognosis could be determined by scintimetry 3 weeks from operation; deficient femoral head vitality predicting healing complications and retained vitality predicting uncomplicated healing. A comparison between pre- and postoperative scintimetry indicated that further impairment of the femoral head vitality could be caused by the operative procedure, and as tetracycline labeling prior to and after fracture reduction in 370 fractures proved equivalent, it was concluded that the procedure of osteosynthesis probably was responsible for capsular vessel injury, using a four-flanged nail. The four-flanged nail was compared with a low-traumatic method of osteosynthesis, two hook-pins, in a prospective randomized 14 month study, and the postoperative femoral head vitality was significantly better in the hook-pin group. This was also clearly demonstrated in a one-year follow-up for the fractures included in the study. Parallel to these investigations, the reliability of the methods of vitality determination was found satisfactory in methodologic studies. For clinical purpose, primary atraumatic osteosynthesis, postoperative prognostic scintimetry and early secondary arthroplasty when indicated, was concluded to be the appropriate approach to femoral neck fracture treatment.

10804 **(LUMEDW/MEOK—1002/1-45(1983)) Malignant tumours of the vulva. A study of the effects of radiotherapy, surgery and cho-emotherapy in combination or used alone.** Simonsen, E. (Lund Univ. (Sweden). Dept. of Obstetrics and Gynaecology). 1983. 45p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704560.

The thesis analyses 317 patients with vulvar malignancies treated at the University Hospital, Lund, during 1960-1979. The three most common histological types of malignancy have been analysed. The oncological clinic in Lund has since the 1960's used a surgical technique where the primary tumour and the regional lymph nodes are operated on in two separate surgical seances. The vulvectomy is performed with tarm knife technique, and the wound is left open. The 5-year crude survival rate for the entire patient material treated with curative intention was over 60 %, which agrees well with reports from other centres. Our surgical approach using two separate seances has, however, much lower rates of postoperative complications and mortality than the rates in other reports. The overall most important prognostic factors for the patients with invasive vulvar malignancies are the presence of lymphatic metastases at the time of surgery, and the surgical radicality of the primary surgery. The treatment at most stages of tumour development and most histological types should include total vulvectomy preoperative irradiation of the inguinal lymph nodes, and inguinal lymphadenectomy. Only local extirpation and hemivulvectomy are, however, indicated for small microinvasively growing squamous cell carcinoma and basal cell carcinoma. Samll invasive onesided squamous cell carcinoma is best treated with ipsilateral surgery combined with preoperative irradiation of the inguinal lymph nodes. Patients with metastases in the inguinal lymph nodes should receive additional irradiation of the inguinal and pelvic lymph node stations.

10805 **(PB—83-256933) Mammographic phantom evaluation project.** McCrohan, J.L.; Thompson, W.E.; Butler, P.F.; Goldstein, H.A.; Phillips, P.R. (National Center for Devices and Radiological Health, Rockville, MD (USA)). Jul 1983. 67p. NTIS, PC A04/MF A01.

Imaging phantoms have been available for a number of years to test and monitor mammographic image quality. One problem is universal to all of these phantoms--correlations have never been objectively made between the qualities or 'scores' of the phantom images and actual patient images. This report describes a study which compared various phantom (and phantom component) images with patient image quality. Correlations were established by determining average patient image quality indices and phantom image scores using the same technique factors, in several mammographic facilities. Images from five phantoms and at least five clinical images of average breasts in the craniocaudal and mediolateral views were collected from each of 21 film/screen and 13 Xerox facilities. Data show that each phantom used for film/screen mammography correlates with clinical image quality to some degree. Data from the Xerox tests are inclusive at this time. Suggestions are made for improving future studies. This report describes the methodology used to determine the phantom image scores and the patient image quality indices, and the various analyses to establish correlations between them.

10806 **(RISO-R—477) Biological effectiveness and application of heavy ions in radiation therapy described by a physical and biological model.** Olsen, K.J.; Hansen, J.W. (Risoe National Lab., Roskilde (Denmark)). Dec 1982. 42p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704547.

A description is given of the physical basis for applying track structure theory in the determination of the effectiveness of heavy-ion irradiation of single- and multi-hit target systems. It will be shown that for applying the theory to biological systems the effectiveness of heavy-ion irradiation is inadequately described by an RBE-factor, whereas the complete formulation of the probability of survival must be used, as survival depends on both radiation quality and dose. The theoretical model of track structure can be used in dose-effect calculations for neutron-, high-LET, and low-LET radiation applied simultaneously in therapy.

10807 **Dosimetric implications of new compounds for neutron capture therapy (NCT).** Fairchild, R.G. (Brookhaven National Lab., Upton, NY). pp 155-160 of Synthesis and applications of isotopically labeled compounds. Duncan, W.P.; Susan, A.B. (eds.). Amsterdam, Netherlands; Elsevier Scientific Publishing Company (1983). (CONF-820666—). Contract AC02-76CH00016.

From International symposium on the synthesis and applications of isotopically labeled compounds; Kansas City, MO, USA (6 Jun 1982).

Systemic application of radiolabeled and/or cytotoxic agents should in principle allow targeting of primary and metastatic neoplasms on a cellular level. In fact, drug uptake in non-target but competing cell pools often exceeds toxic levels before sufficient amounts are delivered to tumor. In addition, specific metabolic pathways generally have a low capacity so that at the large concentration of molecules necessary for therapy, effects of saturation are often found. Application of NCT can circumvent problems associated with high uptake in competing non-target cell pools, as the $^{10}B(N,\alpha)^{7}Li$ reaction is activated only within the radiation field. A comparison of this technique with other modes of particle therapy has indicated that NCT provides significant advantages. A major problem still remains in that it is difficult to obtain vehicles for boron transport which demonstrate both the tumor specificity and concentration requisite for NCT. A number of biomolecules have been investigated which show both the necessary concentration and specificity. These include chlorpromazine, thiouracil, porphyrins, amino acids, and nucleosides. Borated analogs of all the above have been described in the literature. In general, however, these analogs have yet to be made available for NCT. Dosimetric implications of binding sites (intranuclear, cytoplasmic, extracellular) are considered, as well as alternate neutron sources.

10808 **Commercial production of radioisotopes for nuclear medicine, 1970-1980.** Lamb, J.F. (Medi-Physics, Inc., Emeryville, CA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1916-1920(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The first small cyclotrons were installed for commercial production of radioisotopes at New England Nuclear Corporation, Billerica, Massachusetts, and at Medi-Physics, Emeryville, California. Both machines were Cyclotron Corporation Cs-22 multiple particle, fixed energy cyclotrons. In the ten years that followed, the total number of commercial radioisotope producing small accelerators has grown to ten, with four more projected for 1981. The beam

energy requirement for the first accelerators was modest; 22 MeV protons, 12 MeV deuterons, 24 MeV He-4, and 31 MeV He-3; and commercial radioisotope production for nuclear medicine utilized all four particles. The first product available from cyclotron production was fluorine-18 from the $^{16}O(^3He, p)^{18}F$ reaction. Injected intravenously as no-carrier-added $Na^{18}F$, the radionuclide quickly concentrated in bone, providing the nuclear medicine physician with diagnostic information on skeletal abnormalities including metastatic bone disease.

10809 **Production of medical radionuclides with a 24 MeV proton cyclotron.** Vandecasteele, C. (Institute of Nuclear Sciences, Rijksuniversiteit Gent, Proeftuinstrant 86, B-900 Gent). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: 1928-1932(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The CGR-MeV 520 cyclotron of Ghent University is used for the production of radionuclides for medical use. The radionuclides and simple labeled molecules produced are: ^{81}Rb, $^{13}NH_3$, ^{38}K and $^{11}CO_2$. The $^{82}Kr(p,2n)$ ^{81}Rb reaction on natural krypton gas is used to produce ^{81}Rb. The entire procedure is remote-controlled. $^{13}NH_3$ is obtained by irradiation of water with 21 MeV protons, using the $^{16}O(p,\alpha)^{13}N$ reaction. The ^{13}N-containing nitrates and nitrites are reduced to $^{13}NH_3$ with Devarda's alloy. ^{38}K is obtained by irradiation of NaCl, of a saturated NaCl solution or of CCl_4 with 21 MeV αparticles, according to the $^{35}Cl(\alpha,n)$ ^{38}K reaction. To produce $^{11}CO_2$, using the $^{14}N(p,\alpha)^{11}C$ reaction, N_2 gas is irradiated with 18 MeV protons. The ^{11}C combines with traces of O_2 to yield $^{11}CO_2$. $^{11}CO_2$ is also used as a starting product for the synthesis of $^{11}CH_3I$. This can be used as a precursor to label more complex organic molecules.

10810 **Proton beams for imaging applications.** Kramer, S.L. (Argonne National Laboratory, Argonne, Illinois 60439). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1910-1915(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The idea of using protons for imaging purposes was suggested more than a decade ago. Since that time, several attempts to demonstrate the usefulness of this technique for medical imaging have been made. However, only recently have detailed analyses of the physical advantages between proton and x-ray imaging been made. These studies show an expected dose reduction of about a factor of 10 for proton compared to x-ray imaging. All of these studies assume that both proton and x-ray systems are working at the quantum statistical limit of sensitivity. However, the complexity of the bremsstrahlung beam, rapid variation of absorptive coefficient with energy, and complexity of making high spatial accuracy and high detection efficiency detectors could seriously limit the practical sensitivity with x-ray imaging.

10811 **Targetry for the production of medical isotopes.** Hichwa, R.D.; Nickles, R.J. (University of Wisconsin, Madison, Wisconsin 53706). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1924-1927(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A high-pressure, low volume, cryogenically-cooled gas target has been developed for tandem Van de Graaff production of medical radiotracers. High yields and radionuclidically pure products are made possible by the use of enriched target materials. The inert Kr-81m (t 1/2 - 13 sec) from the $^{80}Kr(d,n)^{81}Rb$ reaction permits continuous administration from a generator for regional pulmonary ventilation studies. Cryo-pumping and reclamation procedures enhance the economic feasibility of using enriched isotopes by minimizing target losses. Direct extrapolation of those techniques to cyclotron targetry is possible. A low-volume, enriched solid target employing the $^{50}Cr(d,n)^{51}Mn$ reaction has been developed. The mitochondrial concentration of Mn in the heart muscle enables Mn-51 to be used as a myocardial imaging agent.

10812 **Image levels and accuracy in computed tomography.** Goodenough, D.J.; Weaver, K.E. (The George Washington University Medical Center). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1712-1716(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

There are three basic sources of resolution degradation or unsharpness in screen/film radiography: motion unsharpness -- the blurring of a point due to the motion of the patient during the exposure time of the procedure; receptor unsharpness -- the inherent blurring operation caused by the transducing or conversion of x-rays into light within the intensifying screen; and geometric unsharpness (focal spot unsharpness) -- the blurring due to the finite size and x-ray intensity distribution of the x-ray focal spot. Combinations of these sources generally lead to an overall blurring or defocusing effect. This blurring or unsharpness may be characterized by its spatial extent, which is generally the blur size or "point spread function", or by the Modulation Transfer Function (MTF), which describes how the spatial frequencies that make up an object are transferred by the image recording system.

10813 **The state-of-the-art in medical computed tomography.** Wholahan, J.D.; King, D.G. (EMI Medical Inc., Northbrook, IL 60062). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1726-1731(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A new development in computed tomography display systems permits dynamic review of image data along arbitrary planes. This has been shown to be a major step towards the goal of true three-dimensional presentation of clinical information. With the advent of three-dimensional viewing capability, it is necessary to expand the concept of spatial resolution to include the slice thickness parameter. The spatial resolution specification will now have three orthogonal components, and the goal will be to make the longitudinal component more nearly equal to the components in the scan plane.

10814 **High repetition rate volumetric x-ray CT scanning.** Kinsey, J.H.; Orvis, A.L. (Mayo Graduate School of Medicine, Rochester, Minnesota 55901). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1732-1735(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

X-ray computed tomography (CT) has provided a means of solving the superposition problem inherent in conventional radiographic imaging. High repetition rate cylindrical volumetric scanning is a means of applying CT for the purpose of unambiguous visualization and quantitative measurement of moving organ systems such as the heart, lungs, and blood in intact animals and man. A scanning system capable of operating in this manner has recently become operational at the Mayo Clinic. This system, the Dynamic Spatial Reconstructor (DSR), is capable of producing video radiographic images at a repetition rate of 60 times per second from which multiple CT slices may be produced. A stack of 60 contiguous, 1 mm thick, transverse sections spanning a 21 cm high volume containing the beating heart, for instance, can be generated every 1/60 second.

10815 **Design of the Neuro-ECAT: A high-resolution, high efficiency positron tomography for imaging the adult head or infant torso.** Williams, C.W.; Burgiss, S.G.; Burke, M.R.; Crabtree, M.C.; Hoffman, E.J.; Keyser, R.M.; Phelps, M.E. (University of California at Los Angeles, Los Angeles, CA). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1736-1740(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Neuro-ECAT scanner is a positron emission tomograph designed for high resolution cross-sectional imaging of the adult

human head, or the complete torso of a child or small animal. The Neuro-ECAT scanner performs both rectilinear and tomographic scans, in both transmission and emission modes. There are three detector planes, producing five images. Each detector plane contains 88 bismuth germanate detectors, arranged in an octagonal array of 11 detectors per bank. Retained and electrically operated shadow shields provide two choices of reconstructed tomographic resolution, nominally 8.0 and 10.5 mm. Interplane septa, also retained and electrically operated, may be inserted between the detector planes for low noise, highly quantitative measurements, or moved aside for high efficiency scanning of low activity levels. The paper presents the Neuro-ECAT scanner design criteria and a description of the scanner. Data from phantom studies are presented to illustrate system performance.

10816 **Particle accelerators for radiotherapy - A review.** Smith, A.R. (University of New Mexico, Albuquerque, New Mexico 87131). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1876-1879(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Particle accelerators have played a major role in a national effort to test the efficacy of neutrons and heavy charged particles in the treatment of human cancer. Clinical trials are being conducted with neutrons of several different spectra, negative pi-mesons, protons, alpha particles, and neon, argon and carbon ions. These particles offer the possibility of improving the therapeutic ratio between malignant tumors and normal tissues by having either highly localized dose distributions (charged particles only) and/or an increased differential in the biological effect between tumor cells and normal cells. Until recently all of the heavy particle clinical trials have utilized accelerators designed for physics experiments which have often been remote from hospitals and patient care facilities. These accelerators include cyclotrons, syncrocyclotrons, linear accelerators, the linac sections of the Fermilab accelerator, and the Lawrence Berkeley Laboratory Bevalac (Bevatron plus Super HILAC). This paper discusses the various accelerators, their respective particle modalities, and their advantages and disadvantages as radiotherapy facilities.

10817 **Microtrons for electron and photon radiotherapy.** Brahme, A.; Reistad, D. (Instrument AB SCANDITRONIX Husbyborg, 5-755 90 Uppsala). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1880-1883(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

For radiation therapy at medium and high energies the circular and the racetract microtron are ideally suited electron accelerators. The fine energy definition of the electron beam from a microtron allows the use of beam transport from one accelerator to several treatment units. This possibility makes an installation with two or more treatment rooms very interesting from an economical point of view particularly at high energies. The availability of high quality radiation modalities from the compact high energy racetrack microtron may open new possibilities in the treatment of large deep seated tumours.

10818 **Electron linear accelerator structures and design for radiation therapy machines.** Vaguine, V.A. (Varian Associates Inc., Palo Alto, California 94303). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1884-1888(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Requirements for straight- and bent-beam medical accelerator configurations are compared. Technical progress of straight-beam accelerators over the past 12 years is reviewed and the tradeoff between optimized shunt impedance and maximum accelerating gradient in structure design is examined. Relative advantages of side-coupled and interlaced structures are delineated in the light of much higher permissible internal electric fields, recently demonstrated. A novel concept for a single-section standing-wave structure with multiple photon mode capability is presented.

10819 **On achieving a clinically useful D-T neutron isocentric therapy system.** Hilton, J.L.; Hendry, G.O. (The Cyclotron Corp., 950 Gilman Street, Berkeley, California 94710). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1889-1892(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Cyclotron Corporation's Model 4100 Neutron Cancer Therapy System with its output of 8×10^{12} (14 MeV) neutron/sec designed for 500 hours is made up of: a factory recyclable miniature 200 kV sealed tube which radially accelerates up to 450 mA of deuterium and tritium ions from four duoplasmatron-type ion sources onto a central target; hand changeable radiation collimators; boronated hydrogenous shielding; isocentric gantry mounting; clinical diagnostics; and controls. The self-contained gas handling system which provides the needed differential gas pressure also stores, pumps, cleans, and recycles the D-T inventory. It is composed of a reversible getter high vacuum pump, a selective noble gas sputter ion pump, and a specialized uranium trap which, by controlled thermal decomposition of uranium hydride, regulates the ion source pressure. A D-T gas inventory of 3.7 k curies provides beam-on time of about three hours, while the gas recycle requires one to two hours. The four-sided target is made up from an array of heat transfer-optimized small copper tubes and their metal surface cladding which results in relatively high neutron output and long target life. The double vacuum walls, providing redundant tritium containment, are combined with other safety features.

10820 **The treatment head design for medical linear accelerators.** Taumann, L. (Siemens Medical Laboratories, Inc., 2404 N. Main St., Walnut Creek, CA 94596). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1893-1898(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Due to the drastic increase in the therapeutic use of high energy linear accelerators, growing attention is given to the characteristics of the beam parameters. The quality of the beam distribution is highly influenced by the design of the beam exit. Basic considerations for the development of the components of the electron and photon beam exit and their influence on the beam quality and handling of the accelerators are discussed.

10821 **Electron linear accelerator for the pion therapy.** Tsukada, K.; Hayakawa, K.; Minowa, Y.; Sato, K.; Uetomi, I. (Nihon University, Tokyo). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1899-1901(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The electron linear accelerator has been designed for the pion therapy. The accelerating structures are of Disk and Washer (DAW) type and cooled by the help of heat pipes. The energy and beam current of the accelerator, are 500 MeV and 400 μA, respectively, with a conventional RF system. The length of the linac is about 50 m, which is shorter than those hitherto designed for a similar purpose. Production of the pions and inevitable background radiations, mainly, neutrons and electrons, at the target are optimized. A new cooling technique of the target is suggested. Collection of the pions emitted over about 1 str. is performed by using the superconducting coils of the SMPG and axisymmetric types. About 35 rad. 1/min. is expected at the position of a patient.

10822 **Intense neutron source development for use in cancer therapy.** Bacon, F.M.; Cowgill, D.F.; Riedel, A.A.; Walko, R.J. (Sandia National Laboratories, Albuquerque, NM 87185). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1902-1905(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A neutron production rate of 1.1×10^{11}/s from the $D(d,n)^3He$ reaction has been measured from a 200 kV, 200 mA d.c. deuterium ion accelerator during the initial bombardment of a scan-

dium deuteride target. Over a period of 40 h operation, the output decreased to 8 x 10^{10}/s due to impurities in the ion beam being implanted in the target and displacing deuterium just below the target surface. Deuterium concentration depth profiles in the target have been measured which show the deuterium depletion near the surface. The initial neutron output scales to >1 x 10^{13}/s from the T(d,n)^{4}He reaction for a D,T ion beam on a ScDT target, which is the output required for a clinically useful cancer therapy machine. Efforts to reduce the ion beam impurity content to acceptable levels will be evaluated in a new accelerator tube that is described.

10823 **Alchemy with short-lived radionuclides.** Rubio, F.F.; Finn, R.D.; Gilson, A.J. (Mount Sinai Medical Center, Miami Beach, Florida). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1921-1923(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A variety of short-lived radionuclides are produced and subsequently incorporated into radiopharmaceutical compounds in the radionuclide production program currently being conducted at the Cyclotron Facility of Mount Sinai Medical Center. The recovery of high specific activity oxygen-15 labelled water prepared by means of an inexpensive system operating in conjunction with an on-line radiogas target routinely utilized for oxygen-15 labelled carbon dioxide studies is currently receiving particular attention.

10824 **PIXE and the mysteries of Legionnaires' disease.** Chen, J.R. (State University of New York, Geneseo, NY 14454). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1392-1395(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The authors describe the use of proton-induced X-ray emission (PIXE) to analyse the nickel concentrations of the autopsy specimens from victims of Legionnaires' disease. They show that the high nickel concentrations in the lung specimens from the first recognized Legionnaires' cases in Philadelphia in 1976 were due to contamination during the autopsies. Recently the authors have used PIXE to show that the selenium concentrations in the sera of the acutely ill Legionnaires' patients are significantly lower than in their matching convalescent-phase sera. This finding may be related to the patient's response to the disease or to the specific characteristics of the Legionella pneumophila itself. Studies show that the disease is not a rare illness but a worldwide one. General criteria concerning specimen collection are described.

5507 Microbiology

REFER ALSO TO CITATION(S) 9558, 10782

10825 **Nanosecond time-resolved magnetic resonance of the primary radical pair state P/sup F/ of bacterial photosynthesis.** Wasielewski, M.R.; Bock, C.H.; Bowman, M.K.; Norris, J.R. (Argonne National Lab., IL). *Journal of the American Chemical Society;* **105**: No. 9, 2903-2904(4 May 1983). Contract W-31-109-ENG-38.

Direct optical detection of magnetic resonance of the primary radical pair state in bacterial photosynthesis, P/sup F/, which possesses only a 15-ns lifetime is reported. The ability both to monitor and to control the dynamics of radical pair populations directly should prove very useful in determining structure and mechanism in electron-transfer reactions especially in important biological systems such as photosynthesis.

10826 **Whole-cell bioconversion of vanillin to vanillic acid by Streptomyces viridosporus.** Pometto, A.L. III; Crawford, D.L. (Univ. of Idaho, Moscow). *Applied and Environmental Microbiology;* **45**: No. 5, 1582-1585(May 1983). Contract AC02-80ER10755.

A two-step batch fermentation-bioconversion of vanillin (4-hydroxy-3-methoxybenzaldehyde) to vanillic acid (4-hydroxy-3-methoxybenzoic acid) was developed, utilizing whole cells of Streptomyces viridosporus T7A. In the first step, cells were grown in a yeast extract-vanillin medium under conditions where cells produced an aromatic aldehyde oxidase. In the second step, vanillin was incubated with the active cells and was quantitatively oxidized to vanillic acid which accumulated in the growth medium. Vanillic acid was readily recovered from the spent medium by a combination of acid precipitation and ether extraction at ≧96% molar yield and upon recrystallization from glacial acetic acid was obtained in ≧99% purity.

10827 **Radioassay for hydrogenase activity in viable cells and documentation of aerobic hydrogen-consuming bacteria living in extreme environments.** Schink, B.; Lupton, F.S.; Zeikus, J.G. (Univ. of Wisconsin, Madison). *Applied and Environmental Microbiology;* **45**: No. 5, 1491-1500(May 1983). Contract AC02-76EV02161.

An isotopic tracer assay based on the hydrogenase-dependent formation of tritiated water from tritium gas was developed for in life analysis of microbial hydrogen transformation. This method allowed detection of bacterial hydrogen metabolism in pure cultures or in natural samples obtained from aquatic ecosystems. A differentiation between chemical-biological and aerobic-anaerobic hydrogen metabolism was established by variation of the experimental incubation temperature or by addition of selective inhibitors. Hydrogenase activity was shown to be proportional to the consumption or production of hydrogen by cultures of Desulfovibrio vulgaris, Clostridium pasteurianum, and Methanosarcina barkeri. This method was applied, in connection with measurements of free hydrogen and most-probable-number enumerations, in aerobic natural source waters to establish the activity and document the ecology of hydrogen-consuming bacteria in extreme acid, thermal, or saline environments. The utility of the assay is based in part on the ability to quantify bacterial hydrogen transformation at natural hydrogen partial pressures, without the use of artificial electron acceptors.

5508 Morphology

REFER ALSO TO CITATION(S) 10763

10828 **(PNL-SA—11639) Epidemiologic aspects of neural tube defects in the United States: changing concepts and their importance for screening and prenatal diagnostic programs.** Sever, L.E.; Strassburg, M.A. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1983. Contract AC06-76RL01830. 41p. (CONF-8310233—1). NTIS, PC A03/MF A01. Order Number DE84001911.

From New York State Birth Defects Institute symposium; Albany, NY, USA (4 Oct 1983).

This report considers several major epidemiologic aspects of neural tube defects (NTDs). After examining briefly the approaches and goals of epidemiology the traditional epidemiologic concepts of NTDs are reviewed and new interpretations of the epidemiology of these defects is suggested. Three major topics are addressed: (1) that much of our knowledge of the epidemiology of the NTDs comes from areas or periods of high rates of occurrence and that generalizations based on these data may not be applicable to low incidence situations; (2) that the etiology of these defects is multifactorial, involving interaction between genetic and nongenetic factors which may differ in their relative importance between populations; and (3) that anencephalus and spina bifida may be more epidemiologically and etiologically distinct than is usually appreciated. A final consideration deals with some recent contributions of epidemiology to screening and prenatal diagnosis programs.

5509 Pathology

REFER ALSO TO CITATION(S) 10761, 10828

10829 **(BNL—33919) Status of pulmonary host defense in the neonatal sheep: cellular and humoral aspects.** Weiss, R.A.; Chanana, A.D.; Joel, D.D. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Stony Brook (USA). Health Science Center). 1983. Contract AC02-76CH00016. 31p. (CONF-8310231—1). NTIS, PC A03/MF A01. Order Number DE84004307.

From International conference on hematopoietic cellular proliferation; Upton, NY, USA (6 Oct 1983).

In consideration of the sheep neonate as a compromised host, we have examined the status of cellular and humoral pulmonary host defense components at selected developmental time points. The dynamic character of the early neonatal lung free cell (LFC) population, reflected in changes in subpopulations and proliferative capacity, most probably contributed to the observed changes in certain cell responses. For example blood and LFC neutrophil chemotaxis appeared intact by day 1. The ability of alveolar macrophages to elaborate a chemotactic factor(s) was first noted at day 21. Bacteria binding and killing presented a biphasic maturation pattern with full competence not present until day 180. Although the in vitro binding and killing activity of day 8 LFCs was comparable to that of the adult, it may be a poor indicator of in vivo host defense capacity, given the relative paucity of endogenous opsonins at that age. In fact, the interdependence of mediators suggests that the sheep neonate may remain a compromised host during the first three months of life. Cellular and humoral parameters begin to approximate those of adult sheep by 180 days.

5510 Physiological Systems

REFER ALSO TO CITATION(S) 10917

10830 (INIS-mf—8657) Running for life. Studies on the locomotory activity and population dynamics of Pterostichus versicolor Sturm and Calathus melanocephalus L. (Coleoptera, Carabidea). Baars, M.A. (Vrije Univ., Amsterdam (Netherlands)). 22 Oct 1982. 164p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704749.

The research presented in this thesis started summer 1972 and concerned the measurement of locomotory activities of two abundant carabid beetles at Kralo Heath (Province of Drenthe, The Netherlands). Subpopulations at this extensive heathland were defined by the sites of pitfall series. Numbers of Pterostichus versicolor Sturm (= P. coerulescens L.) a spring breeder, showed asynchronous and moderate fluctuations from site to site, while catches of Calathus melanocephalus L., an autumn breeder, fluctuated more vigorously and in parallel at different sites. The original goal of this study was to gain insight into the exchange of beetles between subpopulations. In this respect the most fruitful results were obtained by the daily tracking of beetles labelled with the isotope ^{192}Iridium. The marking procedure which involved mixing ^{192}Ir-$IrCl_3$ with paint and applying to the elytra, is described and the mortality of beetles from radiation effects is briefly considered.

10831 K562 cell anion exchange differs markedly from that of mature red blood cells. Law, F.Y.; Steinfeld, R.; Knauf, P.A. (Univ. of Rochester School of Medicine and Dentistry, NY). *American Journal of Physiology;* **244**: C68-C74(1983). Contract AC02-76EV03490.

Human K562 leukemic cells exhibit several erythroid properties, including synthesis and expression of the major red blood cell coprotein, glycophorin. This has led us to ask if these cells express a functional anion transport system analogous to that which is associated with the other major erythrocyte glycoprotein, band 3. The chloride-36 exchange flux in K562 cells is less than 0.6% of that which would be expected in mature erythrocytes under similar conditions. Unlike red blood cells, K562 cells do not exhibit a high chloride-sulfate selectivity, and various agents that inhibit red blood cell chloride exchange are all much less effective in K562 cells. On the basis of these flux measurements, K562 cells probably contain less than 600 fully functional red blood cell-like band 3 molecules per cell, in contrast to about a million molecules in the mature red blood cell. The possible existence of greatly altered band 3 molecules with a reduced turnover rate and/or a reduced affinity for chloride and for various inhibitors is unlikely but cannot be completely excluded. Anion transport was also measured in K562 cells that had been induced to increase hemoglobin synthesis by various chemical agents. Even under these conditions, chloride fluxes indicated no substantial increase in the number of functional anion transport sites or their chloride transport rate.

10832 Specific binding of [^{11}C]spiroperidol in rat brain in vivo. Arnett, C.D.; Fowler, J.S.; Wolf, A.P.; MacGregor, R.R. (Brookhaven National Lab., Upton, NY). *Journal of Neurochemistry;* **40**: No. 2, 455-459(1983).

Spiroperidol labeled with carbon-11, a short-lived positron-emitting radionuclide, was used to determine the time course of specific binding of this radioligand to the neuroleptic receptor in vivo in the rat. The three major brain pools--specifically bound, nonspecifically bound, and free (unbound)--were determined over a 60-min time course by a rapid filtration technique, utilizing (-)- and (+)-butaclamol pretreatments to assess total and nonspecifically bound activities, respectively, in striatum and cerebellum. The ratio of specifically to nonspecifically bound pools in the striatum was 4.1 at 30 min and 5.1 at 60 min. Thus [^{11}C]spiroperidol may be useful for labeling neuroleptic receptors in vivo for serial studies using positron emission transaxial tomography.

10833 Antigen presentation by peritoneal macrophages from young adult and old mice. Perkins, E.H.; Massucci, J.M.; Glover, P.L. (Oak Ridge National Lab., TN). *Cellular Immunology;* **70**: 1-10(1982). Contract W-7405-ENG-26.

Macrophages perform vital inductive and regulatory functions in immune processes and host defense mechanisms. However, macrophage function during senescence has not been extensively studied. Although antibody response is dramatically reduced in old animals, antigen presentation has never been directly assessed. Therefore, the antigen-presenting capabilities of purified peritoneal macrophages from young adult and old mice were studied by quantitatively measuring their ability to induce antigen specific proliferation of lymph node T lymphocytes. Increasing numbers (10^2 to 10^5) of macrophages from nonimmunized young adult (3 to 6 months) or aged (27 to 36 months) animals were cultured in the presence of antigen with a constant number (2×10^5) of column-separated popliteal lymph node cells from young adult mice. The latter had been immunized with the dinitrophenyl conjugate of bovine γ-globulin in complete Freund's adjuvant by footpad injection. Macrophages from old animals were equal to macrophages from young adult in stimulating T-lymphocyte proliferation, and the kinetics of incorporation was identical with increasing numbers of macrophages from either young adult or old animals. However, greater numbers of resident or induced peritoneal macrophages were always harvested from old animals. Differences in macrophage activity as assessed by different functional parameters may be reconciled by implicating subpopulations of macrophages that perform separate functions, e.g. Ia-positive antigen presenter and Ia-negative scavenger macrophages.

10834 A temporal study at the ultrastructural level of the developing pro-oocyte of Drosophila melanogaster. Grell, R.F.; Generoso, E.E. (Oak Ridge National Lab., TN). *Chromosoma;* **87**: 49-75(1982). Contract W-7405-ENG-26.

The first pro-oocyte in developing pupal germaria of females grown at 25° has been followed at 6 h intervals from its formation at ~ 129 h post-ovipostion until Stage 1, to provide an unambiguous temporal order. EM autoradiographs were made of sectioned germaria, scanned at lower magnification for location of the pro-oocyte(s) within the most posterior 16-cell cyst and photographed at higher magnification to show the presence of label indicating DNA replication and synaptonemal complex indicating synapsis in the same pro-oocyte nucleus. Label, detected at 132 h and at all subsequent intervals up to and including 162 h, delimited an S-phase of 30 h and identified this period as premeiotic interphase. Extensive SCs (av. length 50 μm/genome) measured in serial sections at 132 h provide irrefutable evidence that synapsis in Drosophila begins close to both pro-oocyte formation and initiation of premeiotic interphase. Measurements of SCs at 6 h intervals during interphase reveal a sharp increase between 132 and 138 h, a peak length (~ 75 μm/genome) at 144 h, a decrease and subsequent plateau (~ 60 μm/genome) from 1 50-162 h and a further drop (~ 50 μm/genome) at State 1. Maximal extension of SC at 144 h coincides with maximal genome response to heat (Grell and Day, 1974) and with midpremeiotic-S. Spherical nodules, detected at ~1/genome between 138 and 150 h would, on the questionable assumption that they are the sites of recombination, provide proof of recombination during early interphase, as genetic evidence strongly

implies. Evidence contrary to interpretations of fibrillar material within the nucleus as either precursor of the central region of the SC or sagittal sections of the central element of the SC, is presented. No structure corresponding to the polytene chromocenter was observed.

10835 **Plasma levels of immunoreactive erythropoietin after acute blood loss in man.** Miller, M.E. (Brookhaven National Lab., Upton, NY); Cronkite, E.P.; Garcia, J.F. *British Journal of Haematology;* **52**: 545-549(1982). Contract AC02-76CH00016;W-7405-ENG-48.

Plasma levels of immunoreactive erythropoietin (Ep) were measured after acute blood loss (50, 75, 200 and 450 ml) in man in order to determine the volume of blood loss required to trigger an Ep response as well as to define the reticulocyte response. There was a highly significant ($P<0.01$) linear increase in reticulocyte count after 200 and 450 ml of blood loss. Analysis of trends also showed a highly significant ($P<0.01$) linear response of haematocrit and Ep after a 450 ml blood loss. The reticulocyte count increases were not dependent on a prior increase in Ep level indicating that at least two mechanisms are operative in restoring the red cell mass to normal after blood loss.

5520 Public Health

10836 **(IAEA-R—2696-F) Characterization of sporozoite surface antigens of Plasmodium falciparum, using monoclonal antibodies. Part of a coordinated programme on the preparation of irradiated vaccines against some human diseases. Final report for the period 1 October 1980 - 31 August 1982.** Groot, M. (International Atomic Energy Agency, Vienna (Austria)). Oct 1982. 9p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704121.

Sporozoites are considered as a source of potential vaccine. Characterization of their antigens is therefore important and can be achieved by monoclonal antibodies. The purpose of this project is to study the production of monoclonal antibodies against sporozoites of P. falciparum. Various infections of mosquitoes were carried out during the period 1981-1982 to obtain antigens for the production of hybridomas. Hybridomas were produced from mice immunized through the bites of infected mosquitoes and by intravenous inoculation. The anti-sporozoite activity of the hybridomas was tested by an immunofluorescent antibody test using P. falciparum sporozoites as antigens. Positive immunofluorescence was seen in hybridoma cell lines tested with P. falciparum, whereas negative results were obtained when the cell lines were cross-reacted with other human species (P. vivax) and with a rodent malaria parasite (P. berghei).

5530 Agriculture And Food Technology

REFER ALSO TO CITATION(S) 10488

10837 **(IAEA-R—2032-F) Fate and persistence of ^{14}C pesticide residues in different soils: effects of ^{14}C pesticide contaminated run-off soil water on biological systems. Part of a coordinated programme on isotopic-tracer-aided studies of agrochemical residue - soil biota interactions. Final report for the period 1 August 1977 - 31 August 1982.** Lichtenstein, E. (International Atomic Energy Agency, Vienna (Austria)). Sep 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704120.

The interaction of selected fungicides, herbicides and N-fertilizers with microorganisms in cranberry soils and their effects on the degradation of ^{14}C-phenyl-parathion were investigated. Incubation of soils with parathion or p-nitrophenol for 4 days, followed by the addition of ^{14}C-parathion resulted after 24 h in an enhanced degradation of the insecticide to $^{14}CO_2$ (34-39% of the applied radiocarbon as opposed to 2% in controls) and also in an increased binding of ^{14}C to the soil. The fungicide captafol inhibited the degradation of soil-applied ^{14}C-parathion as evidenced by a reduction of both $^{14}CO_2$ evolution and ^{14}C-bound residues. Maneb and benomyl suppressed the degradation of ^{14}C-parathion to $^{14}CO_2$ but not the formation of bound residues. Addition of 2,4-D to ^{14}C-parathion treated soil also resulted in an increased persistence of the insecticide. Studies conducted with the insecticide and $(NH_4)_2SO_4$, NH_4NO_3, KNO_3 or urea showed that under all experimental conditions the total amounts of ^{14}C recovered were similar, yet the distribution of ^{14}C-compounds into benzene-soluble, water-soluble and bound residues was not. This possibly indicated a change in the pathway of ^{14}C-parathion degradation. The insecticide was most persistent in soils containing $(NH_4)_2SO_4$, as demonstrated by a recovery of 29% of the applied radiocarbon in benzene-soluble form. Analyses by TIC of this benzene extraction phase revealed the presence of ^{14}C-parathion, ^{14}C-p-aminophenol and ^{14}C-aminoparathion.

10838 **Mechanical properties of the plasma membrane of isolated plant protoplasts.** Wolfe, J.; Steponkus, P.L. (Cornell Univ., Ithaca, NY). *Plant Physiology;* **71**: 276-285(1983). Contract AC02-81ER10917.

The volume of isolated protoplasts of rye (Secale cereale L. cv Puma) in a suspending solution at constant concentration is shown to be negligibly changed by tensions in the plasma membrane which approach that tension necessary to lyse them. This allows a detailed investigation of the plasma membrane stress-strain relation by micropipette aspiration. Over periods less than a second, the membrane behaves as an elastic two-dimensional fluid with an area modulus of elasticity of 230 millinewtons per meter. Over longer periods, the stress-strain relation approaches a surface energy law--the resting tension is independent of area and has a value of the order 100 micronewtons per meter. Over longer periods the untensioned area, which is defined as the area that would be occupied by the molecules in the membrane at any given time if the tension were zero, increases with time under large imposed tensions and decreases under sufficiently small tension. It is proposed that these long term responses are the result of exchange of material between the plane of the membrane and a reservoir of membrane material. The irreversibility of large contractions in area is demonstrated directly, and the behavior of protoplasts during osmotically induced cycles of contraction and expansion is explained in terms of the membrane stress-strain relation.

56 BIOMEDICAL SCIENCES, APPLIED STUDIES

5601 Radiation Effects

REFER ALSO TO CITATION(S) 9860, 10680, 10711, 10720, 10720, 10750, 10783, 10827, 10920, 10949, 10951, 10951, 11157

10839 **(BNL—33792) Conceptual basis for evaluating risk from low-level radiation exposure.** Bond, V.P. (Brookhaven National Lab., Upton, NY (USA)). 1981. Contract AC02-76CH00016. 41p. (CONF-8104228—1). NTIS, PC A03/MF A01. Order Number DE84002882.

From 17. annual meeting of National Council on Radiation Protection and Measurements; Bethesda, MD, USA (8 Apr 1981).

Serious or lethal injuries that may result from the exposure of animals or human beings to ionizing radiations can be divided into two distinctly different categories, on the basis of whether the injury results only from failure of an entire vital organ, or stems from impairment of the function of a single cell. These two categories of injury are termed here organ effects, normally induced by non-stochastic processes, and single cell effects, normally induced by stochastic processes. This presentation is limited to low-level radiation exposure (LLR) since: (1) only with single hit kinetics does the average number of cell doses per cell in the exposed population essentially equal the number of cells dosed; (2) in excluding multihit all-or-none effects, the functions developed are essentially independent of the time rate at which the (instantaneously deposited) cell doses are laid down, and of considerations of repair of sub-effect injury; and (3) it makes little or no difference with LLR if the incidence of single cell effects is expressed in terms of exposed or surviving cells.

10840 **(CONF-820409—6) Ultrastructural effects of radiation on cells and tissues: concluding remarks.** Seed, T.M.; Carr, K.E. (Argonne National Lab., IL (USA); Glasgow Univ. (UK). Dept. of Anatomy). 1982. Contract W-31-109-ENG-38. 3p. NTIS, PC A02/MF A01. Order Number DE84003454.

From Scanning electron microscopy annual meeting; Anaheim, CA, USA (25 Apr 1982).

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Concluding remarks which condense the subject matter covered in the preceding series of reports which indicate the complex nature of the biological response to ionizing radiation and the inherent difficulties associated with developing unifying concepts and definitions. The multiplicity of the major response variables, i.e., specimen type, radiation parameters, analytical approach and endpoints measured, is undoubtedly a major problem. In these studies, the specimens analyzed ranged from eucaryotic algae grown in vitro in suspension cultures to brain tissue of cancer patients. Specimens were irradiated with now fewer than seven types of ionizing radiation, which varied both in quality (i.e., high and low LET) and quantity (i.e., doses from 0.1 to 90 Gy). Exposure regimens included single, fractionated, and chronic exposures. Further, there were major differences in the analytical approach employed (e.g., structural and functional assays) and end-points measured (e.g., lethality, cell growth, surface topography, etc.).

10841 (CONF-821215—, pp 13-23) **Overview of current programs and trends in assessment of health effects.** Thiessen, J.W. (Dept. of Energy, Washington, DC). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Radiation research programs of the US DOE are discussed in the presentation. Data bases have been established from epidemiological studies on radiation exposures and effects in atom bomb survivors, nuclear facility personnel, radium dial painters and populations living downwind from above- and below-ground nuclear tests. In addition, a Risk Analysis Program has been established to evaluate energy technologies and related problems with respect to their health and environmental uncertainties. 8 figures. (JMT)

10842 (CONF-821215—, pp 31-41) **PNL's environmental protection support project for the Office of Operational Safety.** Corley, J.P.; Jaquish, R.E. (Pacific Northwest Lab., Richland, WA). Aug 1983. NTIS, PC A24/MF A01. Contract AC06-76RL01830.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

The objectives and a brief history of the PNL project entitled Environmental Protection Support and Assistance to DOE Office of Operational Safety are presented, including the major tasks undertaken to date, and the current year's efforts. The major products of this effort have been: A Guide for Environmental Radiological Surveillance at US Department of Energy Installations. DOE/EP-0023 (ERDA 77-24 revised); A Guide for Effluent Radiological Measurements at DOE Installations, in process of publication, and summaries of the annual environmental reports from DOE sites. Support documentation is mentioned. A major effort is currently underway to provide additional guidance on environmental data reporting, including non-radiological pollutants and with emphasis on non-compliance events. 4 references, 10 figures.

10843 **(CONF-831258—1) Quantitative and molecular analyses of mutation in a pSV2gpt transformed CHO cell line.** Stankowski, L.F. Jr.; Tindall, K.R.; Hsie, A.W. (Tennessee Univ., Oak Ridge (USA). Graduate School of Biomedical Sciences; Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 23p. NTIS, PC A02/MF A01. Order Number DE84004428.

From 15. international congress of genetics, satellite symposium on mutagenesis: basic and applied; Darbhanga, India (22 Dec 1983).

Following NDA-mediated gene transfer we have isolated a cell line useful for studying gene mutation at the molecular level. This line, AS52, derived from a hypoxanthine-guanine phosphoribosyl transferase (HGPRT) deficient Chinese hamster ovary (CHO) cell line, carries a single copy of the E. coli xanthine-guanine phosphoribosyl transferase (XGPRT) gene (gpt) and exhibits a spontaneous mutant frequency of 20 TG/sup r/ mutants/10^6 clonable cells. As with $HGPRT^-$ mutants, $XGPRT^-$ mutants can be selected in 6-thioguanine. AS52 ($XGPRT^+$) and wild type CHO ($HGPRT^+$) cell exhibit almost identical cytotoxic responses to various agents. We observed significant differences in mutation induction by UV light and ethyl methanesulfonate (EMS). Ratios of $XGPRT^-$ to $HGPRT^-$ mutants induced per unit dose (J/m^2 for UV light and $\mu g/ml$ for EMS) are 1.4 and 0.70, respectively. Preliminary Southern blot hybridization analyses has been performed on 30 $XGPRT^-$ AS52 mutants. A majority of spontaneous mutants have deletions ranging in size from 1 to 4 kilobases (9/19) to complete loss of gpt sequences (4/19); the remainder have no detectable (5/19) or only minor (1/19) alterations. 5/5 UV-induced and 5/6 EMS-induced mutants do not show a detectable change. Similar analyses are underway for mutations induced by x-irradiation and ICR 191 treatment.

10844 **(DOE/ER/60017—2) Inducible error-prone repair in B. subtilis. Progress report, May 1, 1983-April 30, 1984.** Yasbin, R.E. (Rochester Univ., NY (USA). Dept. of Microbiology). Dec 1983. Contract AC02-81ER60017. 12p. NTIS, PC A02/MF A01. Order Number DE84004895.

DNA repair mechanisms in Bacillus subtilis were investigated following mutagenesis via ultraviolet radiation or by chemical mutagens. A bioassay is described whereby the efficiency of repair mechanisms can be measured. DNA cloning studies to transfer the photoreactivation gene from E. coli to B. subtilis are reported. The mutation, which induces the SOS-like system in B. subtilis when grown at 45°C, was characterized in order to begin delineation of the genes controlling this system, efforts directed at isolation and cloning of a DNA Polymerase III gene of B. subtilis are related. (DT)

10845 **(DOE/ER/60119—T1) Lung cancer epidemiology in New Mexico uranium miners. First annual report, 1 April 1983-1 January 1984.** Samet, J.M. (New Mexico Univ., Albuquerque (USA)). Jan 1984. Contract AS04-83ER60119. 45p. NTIS, PC A03/MF A01. Order Number DE84005322.

Portions are illegible in microfiche products.

This Technical Progress Report for the first nine months of the contract Lung Cancer Epidemiology in New Mexico Uranium Miners describes by task the activities finished or begun since April, 1983. Data collection during the period has included copying all available Grants Clinic examination records for miners in the current study cohort, for completion of smoking and mining histories, and abstracting, coding, and verifying 500 of these records; copying all State Mine Inspector reports and abstracting, coding, and verifying 225 of these records; coding, verifying, and keying all except one batch of employment histories from companies, and tracing gaps in histories through company personnel logs; receipt of output from the National Institute of Occupational Safety and Health with information on New Mexico miners included in the US Public Health Service Colorado Plateau study; and updating some 30 miners from status unknown to status known by means of new information from personnel offices, the Grants Clinic, and interviews in the community. In order to examine the feasibility of a study of later miners, we have created a computer file of working level months (WLM) records, cumulated WLM for each miner for each year, and cumulated WLM for each miner over the years 1967 to 1982. We have records for 10,516 miners not in the current cohort, most of whom began mining in the 1970's. They have relatively low WLM because of their later, briefer mining experience. We have not yet done power calculations based on complete WLM data, 1967 to 1982. We have also not yet collected Grants Clinic examination records for all these miners.

10846 **(DOE/EV/70264—T1) Influence of late radiation effects on the immunological parameters of aging. Final technical report, September 1977-August 1983.** Makinodan, T. (California Univ., Los Angeles (USA)). 1983. Contract AT03-76EV70264. 64p. NTIS MF A01. Order Number DE84005120.

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A series of tests of immunologic function were used in assessing the immune status of individuals who survived the atomic bombs in Japan in 1945. A-bomb survivors (n=189) residing in the US were recruited to participate in the study. Survivors exposed to varying low doses of radiation (S/sub +/ group) had healthier immune responses than those exposed to O rads (S_0 group). The difference was significant for natural cytotoxicity ($p = .028$). Less striking differences with the same trend (i.e., S/sub +/ healthier than S_0) were observed with: the mixed lymphocyte reactions, mitogenic response to PHA, interferon production, serum interferon levels (all S/sub +/ > S_0), frequency of detectable immune complexes, rheumatoid factor, and antimitochondrial antibodies (all S/sub +/ > S_0). In order to study the Japanese A-bomb survivors, a collaborative study was initiated with the Radiation Research Effects Foundation in Hiroshima, Japan. Immunologic tests were performed on blood samples from 278 individuals including 202 survivors of whom approximately one-third each were exposed to 0, 1-99, and 100+ rads at the time of the bomb. A decrease in immune responses was observed with increasing exposure. It is interesting that, consistent with our findings on the American survivors, the Japanese survivors exposed to 1-9 rads showed a small increase in natural cytotoxicity compared to the group exposed to 0 rads. Females showed a stronger dose-related decline than males (who may have shown a slight increase) with natural cytotoxicity, and both groups showed a small effect with interleukin 2 production. With both tests males were higher than females. Natural cytotoxicity increased significantly with age, as did serum immune complex levels. In the pilot study of the murine model for plasmacytoma formation, it was shown that age and radiation may both predispose to plasmacytoma formation. 22 references, 5 tables.

10847 **(FOA-C—40161-W4) Oral intake of radionuclides in the population. A review of biological factors of relevance for assessment of absorbed dose at long term waste storage.** Johansson, L. (Foersvarets Forskningsanstalt, Umea (Sweden)). Nov 1982. 61p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704553.

Dose factors of some radionuclides have been reviewed with respect to a chronic oral intake by members of the public. The radionuclides taken into account are Pu-239, Np-237, Ra-226, Th-230, Pa-231, Tc-99 and I-129, all of which might be of potential hazard at a long-term storage disposal. The parameter which has the major influence on the dose factor, for most of the radionuclides studied, is the uptake from the gut. In order to assess the dose factor it is therefore essential to make a good estimate of the gastrointestinal uptake of the radionuclides under the actual conditions. The annual limit of intake (ALI) given in ICRP 30, is intended to be applicable on a population of workers, and for a single intake. The gut uptake figures in the ICRP-publication are based mainly on uptake values received in experiment animals given single relatively large oral doses of the isotope studied. From a review of current literature, gut absorbtion factors and dose factors to be used for members of the public at a chronic oral intake, are suggested. Compared with those for workers in ICRP 30, the dose factors are increases for plutonium and protactinium, and decreases for neptunium.

10848 **(IAEA-R—1929-F) Study of radionuclides interaction with hydrophytocenosis. Part of a coordinated programme on isotopic-tracer-aided research and monitoring on agricultural residue-biological interactions in aquatic ecosystems. Final report for the period 1 January 1977 - 3 June 1982.** Marchiulioniene, J.D. (International Atomic Energy Agency, Vienna (Austria)). [nd]. 3p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704549.

The aim of the work described here was to study: the effect at various concentrations of lead, effluent from pulp and paper production and DDT on the physiological state of algae (as assessed from the membrane potentials, the protoplasmic drifting velocity and the cell survival rate); the effect of thermal contamination on the physiological state of algae (assessed from the protoplasm mobility and cell survival rate) and on the accumulation of radionuclides in hydrophytes; and the effect of radionuclides on chlorella populations (the state of which was assessed from the cell density, the rate of photosynthesis and the number of mutant and lethally damaged cells).

10849 (IAEA-TECDOC—289, pp 7-11) **M_1 chimerism following mutagen treatment of seeds in rice and some other cereals.** Kawai, T. (Joint FAO/IAEA Div. of Isotope and Radiation Applications of Atomic Energy for Food and Agricultural Development, Vienna (Austria)). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Articles reporting on M_1 chimerism following treatment of seed with mutagen in cereals were mostly published in the 1960's. Rice is a good material for making such studies because of its relatively large number of seeds per panicle, rather easily identifiable tillering and panicle branching systems and uniform growth after seedling transplanting. The present article summarizes results of studies on M_1 chimerism in rice and some other cereals which may serve as reference information in discussing M_1 chimerism of those plant species showing different development patterns, as dicotyledonous plants, following treatment of seed with mutagen. Studies on M_1 chimerism provide not only knowledge of the sporophyte development but also basic information for developing methods of harvesting M_2 seed which provide the maximum numbers of mutants of different origins in a limited number of M_2 plants.

10850 (IAEA-TECDOC—289, pp 13-17) **Chimerism in irradiated dicotyledonous plants.** Davies, D.R. (John Innes Inst., Norwich (UK)). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

There are many factors which influence the survival and recovery of mutant cells and their derivatives in irradiated meristems. Some of the most important are discussed in this summary, and in addition possible methods of maximising the recovery of mutant tissues are considered.

10851 (IAEA-TECDOC—289, pp 23-24) **Chimera formation in M_1 pea plants raised from mutagen-treated seeds.** Saccardo, F. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Centro di Studi Nucleari). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Short communication only.

10852 (IAEA-TECDOC—289, pp 31-32) **Gametophyte irradiations in some dicotyledonous crop species. Prospects and results.** Saccardo, F. (Comitato Nazionale per l'Energia Nucleare, Casaccia (Italy). Centro di Studi Nucleari). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Short communication only.

10853 (IAEA-TECDOC—289, pp 33-34) **Efficiency of mutation programmes.** Dellaert, L.M.W. (Ministry of Agriculture and Fisheries, 's Gravenhage (Netherlands)). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Short communication only.

10854 (IAEA-TECDOC—289, pp 35-42) **Chimerism in M_1 plants of Vicia faba, Capsicum annuum and Linum usitatissimum.** Hermelin, T.; Brunner, H.; Daskalov, S.; Nakai, H. (International Atomic Energy Agency, Seibersdorf (Austria). Laboratories). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

One important task of our group at IAEA is to develop procedures aiming to improve sampling of M_2 seeds to facilitate the recovery of a maximum number of induced mutations in crop plants. Results from studies on three species are reported in this paper.

Seeds have been mutagen treated and the chimeric M_1 plants were progeny tested in M_2. The position of the M_2 seeds on the M_1 plants has been recorded.

10855 (INIS-mf—8299, pp 53-54) **Inactivation of mammalian cells and DNA with light and heavy ions.** Kraft, G.; Meister, H.; Schubert, M. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)); Kraft-Weyrather, W.; Miltenburger, H.G. (Technische Hochschule Darmstadt (Germany, F.R.)); Roots, R. (Lawrence Berkely Lab., CA (USA)). 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

The inactivation cross section of Chinese hamster cells V79 and the induction of double and single strands breaks in viral DNA (SU40) for various ions from helium to uranium has been measured in the energy range between 1 and 10 MeV/u.

10856 (INIS-mf—8641, pp 43-45) **Repair of radiation damage of Micrococcus radioproteolyticus due to gamma and UV irradiation.** Ryznar, L.; Drasil, V. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Cells were irradiated in dry state with gamma radiation and UV radiation. The post-irradiation warming of freeze dried cells (2 hours to 60deg or to 80deg) influenced the ability to repair sublethal damage. Heating to 80deg caused a mild reduction in survival. The repair of irradiated and heated cells required more time than that of cells which had only been irradiated. (M.D.).

10857 (INIS-mf—8641, pp 93-95) **Competition of macromolecular DNA and ^{3}H-dTh in unprogrammed DNA synthesis in LS/B1 cells.** Benes, L.; Blazicek, G.; Karpfel, Z.; Slotova, J.; Velcovsky, V. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The incorporation was observed of ^{3}H-dTh in DNA cells of an ascite lymphosarcoma in the course of an unprogrammed DNA synthesis induced by 50 Gy of gamma radiation. The amount of ^{3}H-dTh incorporated in the DNA during the said synthesis declined progressively with the concentration of macromolecular DNA. It is concluded that exogenous DNA survives for a certain period in the cell and provides fragments which are used in the repair process. This view is endorsed by the fact that at high concentrations of exogenous DNA ^{3}H-dTh is utilized. (M.D.).

10858 (INIS-mf—8641, pp 96-98) **Kinetics of ^{3}H-dTh incorporation in DNA in unprogrammed DNA synthesis.** Rotreklova, E.; Benes, L.; Velcovsky, V. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The incorporation of ^{3}H-dTh in DNA was studied on cells of a mice lymphosarcoma in vitro in dependence on the radiation dose which induced unprogrammed DNA synthesis. The amount of incorporated ^{3}H-dTh increased with the dose up to 5O Gy while a dose of 200 Gy inhibited the unprogrammed synthesis. 150 mins after irradiation no dependence could be shown between the rate of unprogrammed synthesis and the repair rate of the damaged DNA molecule. The level of ^{3}H activity released from the DNA of irradiated cells into the incubated medium was in agreement with the incorporation of ^{3}H-dTh in the DNA in the course of unprogrammed synthesis. (M.D.).

10859 (INIS-mf—8641, pp 99-101) **In vitro study of radiation damage of bacterial DNA.** Blazicek, G.; Bohacek, J. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The content was determined of admixtures, low-molecular and polymer substances, in preparations of separated DNA which may influence the results of experiments investigating the radiosensitivity of DNA in vitro. The samples were analyzed for protein, RNA, polysaccharide and ethyl alcohol content. A set of 15 samples of DNA was studied separated from bacterial strains differing in the percentage of guanine and cytosine. An evaluation of deviations of the values of the relative contamination content showed that the deviations do not significantly exceed the determination error and that the preparations of the said set may be considered to be comparable. (M.D.).

10860 (INIS-mf—8641, pp 46-52) **Effect of dark repair inhibitors on survival of phage SPP1 Bacillus subtilis following UV irradiation.** Janovska, E.; Vizdalova, M.; Pillich, J. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The extent of damage caused by UV radiation in phage SPP1 and its separated DNA was observed. Acriflavine and ethidium bromide completely supressed the repair of the phage by host cells, caffeine in a 0.1% concentration delayed the repair process only slightly. The survival of infectious DNA on host cells was reduced only by the effect of ethidium bromide, caffeine mildly increased the survival of DNA. (M.D.).

10861 (INIS-mf—8641, pp 1-3) **Affecting mortality of whole-body gamma-irradiated Beagle dogs.** Dostal, M.; Kuna, P.; Neruda, O.; Petyrek, P.; Simsa, J.; Vavrova, J.; Skopec, F. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The efficacy is compared of radioprotection and the complex treatment of acute radiation syndrome in laboratory dogs. One group of dogs was administered an injection of radioprotectives, the other was a control group. The treated group was administered vitamins and antibiotics in injections after the irradiation. It was found that complex treatment between days 1 and 28 after irradiation is relatively effective. In the treated dogs radioprotection does not significantly influence survival or even reduces survival. (M.D.).

10862 (INIS-mf—8641, pp 4-6) **Changes in Etimizol pharmacokinetics in ^{60}Co irradiated rats.** Trnovec, T.; Soltes, L.; Durisova, M.; Bezek, S. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Ustav Experimentalnej Farmakologie). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The extension was studied of the clearance half-life of Etimizol in irradiated rats as against the control group. This may be caused by a change in kinetics of enzyme systems participating in the metabolization of Etimizol owing to irradiation, possibly by the slowing down of the rate of excretion of the drug into the urine and stool. The growth of the distribution volume of Etimizol in irradiated animals may be related to changes in the permeability of biological membranes. The increase in the distribution volume is the main cause of the increase in the whole-body clearance of the drug following irradiation. (M.D.).

10863 (INIS-mf—8641, pp 7-9) **Experimental infection with Klebsiella pneumoniae and its gentamicin therapy in guinea pigs ^{60}Co irradiated with 4 Gy.** Kallay, Z.; Trnovec, T.; Durisova, M.; Mazurova, E.; Navarova, J.; Plskova, M.; Kettner, M. (Slovenska Akademia Vied, Bratislava (Czechoslovakia). Ustav Experimentalnej Farmakologie); Laginova, V. (Ustav Klinickej Onkologie, Bratislava (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Sublethal irradiation was used to suppress the immunity response of the organism. Following the development of infection with Klebsiella pneumoniae the therapeutical effect was compared of intramuscular administration and of inhalation of gentamicin. Intramuscular administration was statistically significant for reducing the mortality of infected guinea pigs as against non-treated animals at days 7 to 10 after irradiation. Administration by inhalation had the same effect between days 12 and 25 after irradiation. The weight and blood counts of the animals were observed during the experiment. (M.D.).

10864 (INIS-mf—8641, pp 10-12) **Attempt at treating irradiated rats with propolis.** Cabadaj, S.; Praslicka, M. (Univerzita P.J. Safarika, Kosice (Czechoslovakia). Katedra Vseobecnej Biologie); Dobrovoda, I. (Poliklinika Pezinok (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

10865 (INIS-mf—8641, pp 13-15) **Effect of K, Mg salts of aspartic acid on neuromuscular activity of mice following chronic irradiation.** Chlebovsky, O.; Chlebovska, K.; Praslicka, M. (Univerzita P.J. Safarika, Kosice (Czechoslovakia). Katedra Vseobecnej Biologie); Petrovicova, J. (Univerzita P.J. Safarika, Kosice (Czechoslovakia). Prirodovedecka Fakulta). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Female mice were irradiated with gamma radiation at dose rates of 2.3 Gy/day to a total dose of 16.1 Gy. In the drinking water they were given K and Mg salts of aspartic acid. The survival of mice was observed and their weight changes and viability using the test of neuromuscular coordination. At day 30 after irradiation, 89.5% of mice protected with aspartates as against 57.9% of mice unprotected and 100% of non-irradiated mice survived. The physical weight of the protected mice returned to normal by day 15 after irradiation; in unprotected mice at day 30. As concerns the viability test the protected mice were equally successful as non-irradiated, irradiated mice were less successful. (M.D.).

10866 (INIS-mf—8641, pp 16-18) **Treatment of radiation damage of gastrointestinal tract.** Svoboda, V.; Petyrek, P. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)); Hanovcova, J.; Vejbora, D. (Karlova Univ., Hradec Kralove (Czechoslovakia). Lekarska Fakulta). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The efficacy of certain drugs was tested after an acute local irradiation of the abdominal area with doses of 18 Gy and 14 Gy and after whole-body irradiation with a dose of 10 Gy. Local antibiotics treatment reduced mortality up to day 8 after whole-body irradiation, at day 15, however, the number of survivals did not differ from the non-treated group. After irradiation of the abdomen with a dose of 18 Gy no favourable effect of treatment was shown. Irradiation of the abdomen with 14 Gy and application of drugs for a period of three days after irradiation reduced mortality to day 30 after irradiation. (M.D.).

10867 (INIS-mf—8641, pp 19-21) **Long-term inhibition of immunological reactivity of X-irradiated mice and its possible stimulation by thymus shielding during irradiation.** Vovrova, J.; Petyrek, P. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The effect was observed of irradiation on the formation of antibodies against sheep erythrocytes in the course of 64 days after irradiation as was the functional activity of T lymphocytes in the spleen, i.e., cells capable of inducing a graft-host reaction in the course of 360 days after irradiation. Whole-body irradiation induces a long-term profound decrease in the ability of plasmatic cells to form antibodies and also decreases the functional activity of T lymphocytes in the spleen. Shielding of the thymus area significantly accelerated the regeneration of the activity of T lymphocytes and to a lesser extent the restoration of antibody formation. (M.D.).

10868 (INIS-mf—8641, pp 22) **Effect of antibiotics on progress of bacteremia in irradiated animals.** Vejbora, O.; Hanovcova, I. (Karlova Univ., Hradec Kralove (Czechoslovakia). Lekarska Fakulta). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

10869 (INIS-mf—8641, pp 23-25) **Radioprotective efficiency of glucan in gamma-irradiated mice.** Pospisil, M.; Netikova, J. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav); Jary, J.; Marek, M. (Vysoka Skola Chemicko-Technologicka, Prague (Czechoslovakia)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Glucan, a substance separated from the cellular walls of Saccharomyces cerevisiae, stimulates blood formation and resistance to infection. The effects were observed of pre- and post-irradiation application of glucan in mice after whole-body sublethal and lethal gamma irradiation. The principal mechanism of the radioprotective effect of glucan is the intensification of granulocyte production. They post-irradiation effect of glucan as compared with the pre-irradiation effect is less, probably for the smaller number of the respective effector cells. (M.D.).

10870 (INIS-mf—8641, pp 26-28) **Attempt at utilizing antibacterial efficacy of olaquindox in treatment of post-irradiative syndrome.** Pipalova, I.; Pospisil, M. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav); Novacek, L. (Vyzkumny Ustav Cistych Chemikalii, Lachema, Brno (Czechoslovakia)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Quinoxaline derivatives have significant growth stimulation effects, conditioned by the change in the composition and metabolism of the microflora of the alimentary tract, which is manifest by its preventive therapeutical effect and better digestion and use of nutrients. In all experiments a statistically significant positive effect was observed of olaquindox on the survival of mice after an acute whole-body gamma irradiation with 10 to 12 Gy. At day 7 after irradiation the animals treated with olaquindox showed a higher weight. (M.D.).

10871 (INIS-mf—8641, pp 29-31) **Incorporation of ^{125}I-deoxyuridine in blood formation organs of mice as criterion of cystamine radioprotection.** Netikova, J.; Pospisil, M. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Male mice were whole-body irradiated with 5.5 Gy of gamma radiation. Prior to irradiation, cystamine hydrochloride was administered by injection and at days 3, 5, 7 and 9 after irradiation an injection was administered of ^{125}I-deoxyuridine. The weight of the spleen in irradiated mice dropped to approximately 45% at the 3rd day, in mice treated with cystamine radioprotection was manifested by a mild increase in the weight of the spleen at the 5th and 7th day after irradiation. Cellular proliferation in the spleen of irradiated mice dropped at day 3 to approximately 6%, in mice protected by cystamine proliferation was higher. The number of femoral cells dropped at day 3 in irradiated mice to 14%, in protected mice the decrease was less and cell formation was restored more rapidly. Incorporation of ^{125}I is a good indicator of that cystamine is effective only at the 3rd and 5th day after irradiation. The adjustment of thymus weight after irradiation is not affected by cystamine. (M.D.).

10872 (INIS-mf—8641, pp 32-34) **Changes in T and B lymphocyte activity with the radiation damage extent in non-uniform irradiation of mice.** Petyrek, P.; Vavrova, J. (Vojensky Lekarsky Vyzkumny a Doskolovaci Ustav J.E. Purkyne, Hradec Kralove (Czechoslovakia)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Shielding of the head and abdomen during irradiation of mice with 7 Gy of X radiation reduced the manifestations of radiation damage and was especially strongly manifested during the repair of the damage. At different time intervals after irradiation the functional activity of T lymphocytes in the spleen was assessed as to the ability to induce the local graft-host reaction, and the functional activity of B lymphocytes was assessed according to the formation of antibodies against sheep erythrocytes. (M.D.).

10873 (INIS-mf—8641, pp 42) **Autoradiographically determined androgen localization in immunity organs of mice following irradiation.** Hilgertova, J. (Karlova Univ., Prague (Czechoslovakia). Fakulta Vseobecneho Lekarstvi); Sima, P. (Ceskoslovenska Akademie Ved, Prague. Mikrobiologicky Ustav); Vojtiskova, M. (Ceskoslovenska Akademie Ved, Prague. Ustav Molekularni Genetiky). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

10874 (INIS-mf—8641, pp 58-59) **Calcium metabolism in mice following sublethal irradiation.** Justova, V.; Hilgertova, J.; Broulik, P. (Karlova Univ., Prague (Czechoslovakia). 3. Interni Klinika). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

10875 (INIS-mf—8641, pp 60-62) **Acute morphological changes induced in rat central nervous system by irradiation with high energy helium ions.** Tkadlecek, L.; Karpfel, Z.; Viklicka, S. (Ceskoslovenska Akademie Ved, Brno. Biofysikalni Ustav); Fedorenko, B.S.; Kabachenko, A.N. (Institut Mediko-Biologicheskikh Problem, Moscow (USSR)). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Rats were irradiated with helium ions with an energy of 4 GeV/nucleon. Electron and light microscopes were used to investigate ultrathin slices from the vermis cerebelli and the cortex of the parietal area of the brain. Samples were taken 5 to 8 hours after irradiation. An extension of the area around the blood vessels in the white and grey matter of the brain was observed as was the formation of slots and the distancing between the bodies of the neurocytes, neurites, blood vessels and neuroglia cells in the cerebellum and the damage to the Purkynje cells and their immediate neighbourhood. In samples taken 70 to 72 hours after irradiation no differences were found as compared with non-irradiated controls. (M.D.).

10876 (INIS-mf—8641, pp 63-65) **Chronic gamma irradiation and hypothalamo-pituitary system in sheep.** Arendarcik, J.; Praslicka, M.; Molnarova, M. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

After seven days of irradiation with gamma radiation to a total dose of 6.7 Gy the biochemical, morphological and hematological changes were observed in the bodies of sheep. A chromosomal analysis found a very low number of mitoses. A decrease was found in the total trypsin inhibition activity of the plasma. In the hypothalamus were found significant changes in the representation of catecholamines and a decrease was observed in the weight of ovaries and their follicular system was found to be damaged. This damage is more significant from the functional point of view than the damage caused by an acute local irradiation of the ovaries with doses of 4.7 and 9.5 Gy. (M.D.).

10877 (INIS-mf—8641, pp 66-68) **Trypsin inhibitory activity in blood and cervical mucus of sheep following chronic gamma irradiation.** Molnarova, M.; Arendarcik, J.; Pastorova, B. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The effect was investigated of chronic gamma irradiation for a period of 7 days to a total dose of 6.7 Gy. A decrease was found in TIA (trypsin inhibition activity) of blood plasma to 73.6% of the value prior to irradiation. The low-molecular fraction of TIA increased to 194.6%. Later in the experiment the values decreased. The TIA dynamics of the cervical mucus had the reverse character. The values increased; at the 16th day after irradiation they increased up to 392% of the initial values. A comparison with previous experiments shows that acute local irradiation with an almost three-fold dose of the hypothalamo-pituitary area and of the ovaries does not induce significant changes in the blood plasma TIA. (M.D.).

10878 (INIS-mf—8641, pp 69-71) **Morphological changes in organs of sheep perished following irradiation.** Halagan, J.; Arendarcik, J. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Sheep were whole-body gamma irradiated with doses of 6.7 Gy. The main section finding was hemorrhagic diathesis. A detailed description is presented of changes in organs and mucous membranes, of the areas of hemorhages and ecchymoses. (M.D.).

10879 (INIS-mf—8641, pp 72-74) **Catecholamine level and monoamino oxidase activity following irradiation.** Pastorova, B.; Arendarcik, J.; Molnarova, M. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Sheep were whole-body gamma irradiated for a period of 7 days to a total dose of 6.7 Gy. After the irradiation the sheep were destroyed the pituitary and the adrenal glands were separated as was brain tissue for the determination of catecholamines and monoamino oxidase. The results show that the reduced levels of catecholamines in the hypothalamus are probably the result of a reduced synthesis and increased degradation of catecholamines through monoaminooxidase. (M.D.).

10880 (INIS-mf—8641, pp 75-76) **Neurosecretion in hypothalamus of sheep following chronic irradiation.** Stanikova, A.; Rajtova, V.; Arendarcik, J.; Chlebovsky, O. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The neurosecretion and PAS positive mucopolysaccharides were observed in neurons of the rostral, medial and caudal hypothalamus of sheep irradiated for 7 days with a daily dose of 25.77 mC/kg of gamma radiation. A reduction was observed in neurosecretion in the rostral and medial hypothalamus which is probably caused by the decrease in the activity of neurosecretion cells. The activity of the PAS reaction proving the presence of mucopolysaccharides was also reduced. Neurosecretion was mildly increased in the caudal hypothalamus. (M.D.).

10881 (INIS-mf—8641, pp 77-79) **Changes in follicular apparatus of sheep ovaries following irradiation.** Tokos, M.; Arendarcik, J. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Sheep were whole-body gamma irradiated for 7 days to a total dose of 180.77 mC/kg. Investigated were the weight of the sex organs and their histology. A reduced weight of the ovaries was found as was an increased number of atretic follicles. In general, the effect of irradiation is shown by a strong damage of the follicular apparatus of the ovary even in the period of physiological anestrus. (M.D.).

10882 (INIS-mf—8641, pp 80-82) **Histomorphological changes in uterine cervix of sheep following irradiation.** Tokosova, M.; Arendarcik, J. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

Sheep were whole-body gamma irradiated for seven days to a total dose of 6.7 Gy. A quantitative and qualitative microscopic analysis showed greater roundness and articulation of epithelial folds of the cervix uteri. The number and localization of the glands were changed and the surface epithelium of the cervix uteri was reduced. (M.D.).

10883 (INIS-mf—8641, pp 83-85) **Ventricular system ependyma in sheep following chronic irradiation.** Rajtova, V.; Stanikova, A.; Arendarcik, J. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)); Lustik, J.; Briancin, J. (Slovenska Akademie Vied, Kosice (Czechoslovakia). Ustav Experimentalnej Mikrobiologie). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The sheep were whole-body gamma irradiated for 7 days to a total dose of 6.7 Gy. The electron microscope was then used to investigate samples of brain tissues. In the area of the third brain ventricle in different places the single layer ependyma changed into two-layered and multi-layered. In the area of the infundibulum and eminentium medianum the surface of the ependyma is not continuous, the cytoplasm and cell nuclei are strongly vacuolized, at the apical ends they disintegrate. The free surface of ependymal cells is covered with microvilli. (M.D.).

10884 (INIS-mf—8641, pp 86-87) **Changes in utility value and blood count of chickens following chronic irradiation.** Skardova, I.; Fried, K. (Vysoka Skola Veterinarska, Kosice (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

10885 (INIS-mf—8641, pp 90-92) **Effect of gamma radiation on morphological and functioal changes in Japanese quail embryo.** Baumgartner, J. (Vyskumny Ustav Chovu a Slachtenia Hydiny, Laboratorium Genetiky, Ivanka pri Dunaji (Czechoslovakia)). Nov 1982. (In Slovak). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

The eggs of Japanese quail were gamma irradiated at 24 hour intervals from immediately before incubation to the 13th day after incubation with a dose of 6 Gy. Observed were the lethality of embryos, malformation of beak, legs, reduction of embryonal growth, the warping out of internal body organs and edema of the neck. Average hatching rate in the control groups was 74%, in the irradiated group 44%. Most sensitive to irradiation were embryos at the 2nd and 3rd day of incubation, then lethality had a declining trend and again increased on the 11th day of incubation. A quantitative evaluation was made of malformations and other morphological changes of embryos and hatched individuals. (M.D.).

10886 (INIS-mf—8641, pp 39-41) **Factorial analysis of laboratory blood examination in personnel handling ionizing radiation.** Samal, M.; Dienstbier, Z.; Marikova, E.; Bartak, P.; Foltynova, V.; Prouza, Z. (Karlova Univ., Prague (Czechoslovakia). Biofyzikalni Ustav); Tschernoster, E. (Institut pro Klinickou a Experimentalni Medicinu, Prague (Czechoslovakia)); Zarobsky, M. (Ceskoslovenska Akademie Ved, Rez. Ustav Jaderne Fyziky). Nov 1982. (In Czech). NTIS (US Sales Only), PC A07/MF A01. (CONF-8211110—Vol.2).

From National radiobiology conference; Stary Smokovec, Czechoslovakia (21 Nov 1982).

A survey is given of the variability of the results of hematological, biochemical and immunological examination of the blood in selected groups of persons and on factors affecting this variability. Two groups of workers were examined handling ionizing radiation in environments with different levels of professional radiation load and two groups of healthy persons exposed only to the effects of natural radiation background. (M.D.).

10887 **(INS-R—296) Linear hypothesis and radiation carcinogenesis. Arguments for and against its use in estimating risks at low doses.** Roberts, P.B. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Oct 1981. 25p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704324.

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An assumption central to most estimations of the carcinogenic potential of low levels of ionising radiation is that the risk always increases in direct proportion to the dose received. This assumption (the linear hypothesis) has been both strongly defended and attacked on several counts. It appears unlikely that conclusive, direct evidence on the validity of the hypothesis will be forthcoming. We review the major indirect arguments used in the debate. All of them are subject to objections that can seriously weaken their case. In the present situation, retention of the linear hypothesis as the basis of extrapolations from high to low dose levels can lead to excessive fears, over-regulation and unnecessarily expensive protection measures. To offset these possibilities, support is given to suggestions urging a cut-off dose, probably some fraction of natural background, below which risks can be deemed acceptable.

10888 **(INS-R—297) Radiation risk estimation. Major developments and controversies 1976-1981.** Roberts, P.B. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Nov 1981. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704325.

Microfiche only, copy does not permit paper copy reproduction0 refs; 2 tables.

This report outlines the major publications between 1976 and 1981 that have contributed to the evolution of the way in which radiation risks (cancer and hereditary birth defects) are assessed. The publications include the latest findings of the UNSCEAR,

BEIR and ICRP committees, epidemiological studies at low doses and new assessments of the doses received by the Japanese A-bomb survivors. This report is not a detailed critique of those publications, but it highlights the impact of their findings on risk assessment.

10889 (INS-R—310) International status of food irradiation. Roberts, P.B. (Department of Scientific and Industrial Research, Lower Hutt (New Zealand). Inst. of Nuclear Sciences). Sep 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704322.

Recent international moves that are likely to result in an increasing acceptance of irradiated foods are reviewed. Particular attention is given to the activities of the FAO, WHO, Codex Alimentarius and to attitudes in the United States and the Asian-Pacific region. In 1979, the Codex Alimentarius Commission adopted a Recommended General Standard for Irradiated Food. A resume is given of a revised version of the standard that is presently under consideration. However, remaining barriers to trade in irradiated food are briefly discussed, such as legal and regulatory problems, labelling, public acceptance and economic viability.

10890 (SAAS—302) Dosimetry of incorporated transuranic radionuclides. Loessner, V. (Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin (German Democratic Republic)). 1983. 289p. (In German). NTIS (US Sales Only), PC A13/MF A01. Order Number DE83704326.

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Modern in vivo and in vitro techniques for detecting transuranic radionuclides within the human body are described with special emphasis on multiparameter measuring methods developed at the National Board of Nuclear Safety and Radiation Protection. Furthermore, problems related to calibration and interpretation of measuring data are discussed and new methods presented for the calculation of committed dose equivalents on the basis of data from ICRP Publication 30. Also included is an introductory chapter on radiobiological fundamentals of intake, translocation and metabolism of these nuclides.

10891 ^{239}Pu metabolism in newborn and weanling pigs. McClanahan, B.J.; Mahlum, D.D. (Pacific Northwest Lab., Richland, WA). *Health Physics;* **44**: No. 5, 533-539(May 1983).

Newborn (1-2 days old) and weanling (6 wk old) miniature pigs were injected intravenously with ^{239}Pu citrate. Animals from each age group were killed at intervals over a 28-day period to obtain distribution and retention data. The most notable difference between the two age groups was in hepatic deposition and retention. One day after injection, the plutonium content of the liver in neonates was only one-third that in weanling pigs (4.3 vs 13.9% of administered ^{239}Pu). Deposition and retention were not markedly different in individual skeletal components. Cumulative excretion during the first 7 days after injection was the same for each group--1.4% of the injected plutonium.

10892 The distribution of tritium among the amino acids of proteins obtained from mice exposed to tritiated water. Commerford, S.L.; Carsten, A.L.; Cronkite, E.P. (Brookhaven National Lab., Upton, NY). *Radiation Research;* **94**: No. 1, 151-155(Apr 1983). Contract AC02-76CH00016.

The distribution of tritium among the amino acids of serum proteins in mice chronically exposed to tritiated water was determined by ion exchange chromatography of the protein hydrolysate. The specific activity of nonexchangeable tritium in these amino acids relative to the specific activity of tritium in the tissue water of mice ranged from 0.04 for phenylalanine and threonine to 1.0 for glycine and alanine. Since tritium from tissue water can enter the nonexchangeable positions of amino acids only as the result of metabolic processing, the relative specific activity of tritium in each amino acid is an indicator of the extent of such processing. The tritium content of tyrosine and all the amino acids required in the diet for survival is quite low, except for histidine, and can be entirely accounted for by transamination or, in the case of methionine, by transmethylation. The tritium content of the other amino acids is too high to result from such minor processing and must reflect primarily the fraction synthesized de novo. The implications of these findings with respect to the radiobiological consequences of a diet containing tritiated proteins are discussed.

10893 Relationship between number of spleen colonies and ^{125}IdUrd incorporation into spleen and femur. Inoue, T. (Tokyo Metropolitan Inst. of Gerontology, Japan); Bullis, J.E.; Cronkite, E.P.; Hubner, G.E. *Proceedings of the National Academy of Sciences of the United States of America;* **80**: No. 2, 435-438(Jan 1983). Contract AC02-76CH00016.

Graded numbers of bone marrow (BM) cells were injected into fatally irradiated mice. Eight days later the mice were given 3.0 μCi (1 Ci = 3.7 x 10^{10}Bq) of ^{125}IdUrd to label proliferating cells in the spleen and BM. On day 9 the mice were killed and the spleens and femurs were removed for splenic colony assay and measurement of radioactivity in the spleen and femurs. The number of splenic colonies shows a linear relationship with dose of marrow cells injected from 10^4 to 10^5 cells. The slope of the curve of spleen colonies versus number of cells injected is <1, implying that the fraction seeded in spleen decreases with number of cells injected. Above 10^5 and below 10^4 there is a striking departure from the simple linearity. Below 2 x 10^3 cells injected, the logarithm of the observed colony yield is linear with logarithm of the number of cells injected. Poisson calculation of the average number of pluripotent stem cells that should be present with numbers of marrow cells injected below 2 x 10^3 followed closely the actual observations. The data show that there is no detectible proliferation in the BM until the dose of marrow cells exceeds 3.5 x 10^4 cells. Induction of cells into cycle increases the seeding into the BM, and thymidine cytocide drastically reduces seeding in the BM, leading us to conclude that the BM is repopulated almost exclusively by stem cells in DNA synthesis.

10894 Comparison of radiological changes in humans and beagles with skeletal deposits of radium. Morgan, J.P. (Univ. of California, Davis); Pool, R.R.; Kirsh, I.E. *Health Physics;* **44**: No. Sup. 1, 353-363(1983).

At the Laboratory for Energy-related Health Research at the University of California, Davis, semimonthly injections of ^{226}Ra were given to a group of beagle dogs, and periodic skeletal radiography followed, as well as histological studies of the bones. At the Center for Human Radiobiology measurements were made of radium body content in 2259 occupationally or otherwise exposed persons. Of these, 1768 had skeletal radiography (one or more times). In humans, the radiographic changes were, in decreasing order of frequency, osteolytic cortical and cancellous bone destruction, bone sclerosis, pathological fracture, and avascular necrosis of bone. In beagles, osteolytic destruction and pathological fractures were common, avascular necrosis was not observed, but there was frequently cortical thickening and new-bone formation in cancellous bone. In both population groups, there was a high incidence of bone sarcoma. In the beagles, one high-dosage group numbering 38 dogs had 49 malignant bone tumors. Among the 2259 measured persons, there were 60 who had bone sarcoma, and 29 who had cancer of the mastoids or paranasal sinuses. No significant skeletal effects have been diagnosed radiologically in persons with systemic intakes of ^{226}Ra or ^{228}Ra below about 10 μCi or with skeletal doses below about 100 rad. In humans, the lowest skeletal dose at which a bone sarcoma has been diagnosed is 890 rad, and the lowest intake associated with a bone sarcoma is 96 ∫Ci ^{226}Ra or about 1.7 μCi per kg body weight.

10895 Chromosome damage in peripheral lymphocytes from American thorium workers. Hoegerman, S.F.; Cummins, H.T. (Argonne National Lab., IL). *Health Physics;* **44**: No. Sup. 1, 365-371(1983).

An analysis of the frequency of chromosome aberrations in lymphocytes from 47 thorium workers and three external controls is presented. Thirty-seven of these cases were divided into three age-matched groups based upon the means of the sums of their emanating radium-224 and bismuth-212 (Ra + Bi) burdens. The low burden group had two-break chromosome aberrations in 1200 cells, the moderate burden group had three such aberrations in 1000 cells and the high burden group had five such aberrations in 1500 cells. While there is a two-fold increase in the two-break aberration

frequency in pooled data from the two higher exposure groups (8/2500 cells) as compared with the lowest exposure group (2/1200 cells), the difference between these subsamples is not statistically significant ($p = 0.32$). The frequency of dicentrics and centric ring chromosomes (8/3300 cells) in the pooled higher body burden groups from the total sample does however show a very highly significant increase over the historical control frequency. A similar analysis based on total months of employment in the thorium-processing industry did not show a positive relationship between duration of employment and aberration frequency. In broad outline, our results are compatible with those from similar studies on Brazilian thorium workers and Thorotrast patients.

10896 **Retention of uranium in the chest: implications of findings in vivo and postmortem.** Keane, A.T. (Argonne National Lab., IL); Polednak, A.P. *Health Physics;* **44**: No. Sup. 1, 391-402(1983).

An unusually protracted retention of uranium in the chests of certain workers at a uranium processing plant has been reported in the literature. This finding has implications for the protection of current uranium workers and for health-effects studies of early workers. It is shown that the limited data obtained postmortem that have been reported do not reveal a significant unusually protracted retention of uranium in the pulmonary region or in the tracheobronchial lymph nodes. Probable explanations of the disparate findings are discussed. Data are presented on mortality from cancers of lymphatic tissues among males who worked in the period from 1943 to 1947 at the Y-12 Plant, Tennessee-Eastman Corp., Oak Ridge. No significantly increased mortality from these cancers was evident.

10897 **Curium excretion studies in man and baboon: a predictive animal model.** Cohen, N. (Inst. of Environmental Medicine, New York, NY); Burkart, W.; Lo Sasso, T.; Parkinson, W.W. Jr.; Henley, L.C. *Health Physics;* **44**: No. Sup. 1, 403-409(1983). Contract AC02-76EV03382.

A major rationale for performing metabolic research in laboratory animals is to obtain useful information which is applicable to man. Since it is usually impossible to determine many of the kinetic parameters which are responsible for the fate of a contaminant in inadvertently-exposed individuals, it is essential that well-controlled laboratory experimentation in animals be performed. In the present case, we will demonstrate how our experimental protocol, i.e. curium in the adult baboon, can provide a model from which to derive important characteristics of curium in man. To accomplish this goal, we have compared the retention and excretion patterns of curium in several men accidentally exposed via inhalation, burns, or puncture wounds with that of ^{243,244}Cm citrate injected i.v. in nine adult baboons. Although many of the exposure conditions are different in considering the two primate species (human and nonhuman), biokinetic research in the baboon may serve to estimate tissue burdens and dose commitments in man. Comparison of the excretion rates of the nuclide in the urine of man and the baboon gives similar half times between days 10 and 50 post exposure.

10898 **Measured ^{234,238}U and fallout ^{239,240}Pu in human bone ash from Nepal and Australia: skeletal alpha dose.** Fisenne, I.M. (Environmental Measurements Lab., New York); Perry, P.M.; Chu, N.Y.; Harley, N.A. *Health Physics;* **44**: No. Sup. 1, 457-467(1983). Contract AC02-76ER03077;AC02-80EV10374.

Human bone samples from Nepal and Australia were analyzed for isotopic uranium and fallout plutonium. The Nepalese samples were obtained for a 3-yr period (1976-78) while the Australian samples are representative of a single year (1977). The surface air plutonium concentrations for the latitude bands of these countries were either measured and/or estimated from 1954 through 1978. With the plutonium air concentrations and age-dependent breathing rates as input data, the measured human bone results were compared with skeletal estimates derived from the ICRP Task Group Inhalation Model, and the agreement was found to be reasonably good. The measured isotopic uranium concentrations in these samples provide a benchmark against which to assess fallout plutonium based upon a comparison of the skeletal α radiation dose from a natural actinide to these populations.

10899 **An update of epidemiologic studies of plutonium workers.** Voelz, G.L.; Wilkinson, G.S.; Acquavella, J.F.; Tietjen, G.L.; Brackbill, R.N.; Reyes, M.; Wiggs, L.D. (Los Alamos National Lab., NM). *Health Physics;* **44**: No. Sup. 1, 493-503(1983).

Retrospective and prospective epidemiologic studies are being conducted as part of a national survey of plutonium workers at four Department of Energy facilities (Los Alamos, NM; Rocky Flats, CO; Mound Laboratory, OH; and Savannah River, SC). A preliminary analysis of mortality was done for all white males who have worked at the Rocky Flats Plant during the period 1952-79. The 452 observed deaths were significantly fewer than the 831 expected for all causes. The 107 deaths due to all malignant neoplasms were also derived from age and calender-specific death rates for U.S. white males. Deaths reported for benign and unspecified neoplasms numbered eight versus an expected two, a significant elevation. These tumors, all intracranial, are the subject of a case-control study to be reported later. Subdividing the cohort on the basis of plutonium exposures and external radiation exposures results in similar overall findings. The benign and unspecified neoplasms, however, were not significantly high in the plutonium-exposed group.

10900 **Dose-response relationships for bone cancers from plutonium in dogs and people.** Muggenburg, B.A.; Mewhinney, J.A.; Griffith, W.C.; Hahn, F.F.; McClellan, R.O.; Boecker, B.B.; Scott, B.R. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Health Physics;* **44**: No. Sup. 1, 529-535(1983). Contract AC04-76EV01013.

The risk of bone cancers developing from internally deposited plutonium must be estimated from studies in laboratory animals because no plutonium-induced cancers have been observed in people. Studies of the effects of ^{226}Ra and ^{239}Pu injected into beagle dogs at the University of Utah and $^{238}PuO_2$ inhaled by beagle dogs at the Inhalation Toxicology Research Institute provide a key link to understanding the long-term effects of inhaled α-emitting radionuclides in people. Injected radium and plutonium are rapidly deposited in bone whereas plutonium deposited in lung by inhalation is translocated to bone more slowly, depending on its chemical form. The development of bone cancers is a late occurring effect seen after either injection of plutonium or radium or inhalation of plutonium. The incidence of bone cancers from α radiation to the skeletons of dogs was compared to bone cancer incidences in radium dial painters to estimate bone cancer risk from inhaled plutonium in people. A risk factor of 1200 bone cancers/10^6 rad to skeleton (average dose) was estimated.

10901 **Measurement techniques for radium and the actinides in man at the Center for Human Radiobiology.** Toohey, R.E.; Keane, A.T.; Rundo, J. (Argonne National Lab., IL). *Health Physics;* **44**: No. Sup. 1, 323-341(1983). Contract W-31-109-ENG-38.

Various techniques are employed to determine the amounts, retention, and distribution of radioactivity in human subjects in vivo. The principle methods is γ-ray spectrometry with large NaI(Tl) scintillation crystals ("whole-body counting"). There are three primary methods of calibrating the detectors. The first is analytical, in which a rigorous mathematical treatment is employed; the second involves the administration of tracer amounts of radioactivity to human volunteers; the third consists of determining detector response to known amounts of radioactivity in a phantom. For both radium and thorium cases measured in vivo, the interpretation of the results is complicated by the fact that neither radium nor thorium emit γ rays of any consequence. Instead, the observed γ rays result from the decay of ^{214}Bi (RaC) and ^{208}Tl (ThC"), respectively. Since each of these nuclides is preceded in the decay chain by an isotope of the noble gas radon, some of which is exhaled, its activity is not equal to that of the parent radium or thorium. Therefore, breath samples are collected to determine the exhalation rate of the precursor isotope, ^{222}Rn (radon) or ^{220}Rn (thoron). The total body content is then the sum of the γ activity and the exhaled radioactivity, referred to as the retained and emanating fractions, respectively.

10902 **Can information on the gastrointestinal absorption of actinide elements by neonatal rats, guinea pigs, dogs and swine be extrapolated to man?.** Sullivan, M.F.; Gorham, L.S. (Pacific Northwest Lab., Richland, WA). *Health Physics;* **44**: No. Sup. 1, 411-417(1983). Contract AC06-76RL01830.

Administration of ^{238}Pu nitrate to piglets results in absorption that is 1000 times the adult value but neonatal dogs, guinea pigs and rats absorb only 100 times more ^{238}Pu than adults. Neonatal pigs and rats retain as much as 60% of the dose in the gut mucosa for several days but dogs and guinea pigs retain much less. We have also found this difference in GI tract ^{238}Pu retention to occur after inhalation, indicating that the gut is an important route of entry for actinides that are inhaled by neonates. Although retention of different gavaged actinides by suckling rats is within the same range (1-3%) we found retention by piglets to range between 35% for ^{233}U and about 2% for ^{237}Np, ^{244}Cm and ^{241}Am nitrate. While the GI tract of the human infant is probably not nearly as permeable to macromolecules as that of the swine, it is known to be more permeable to macromolecules than that of the adult human. If actinide absorption is also increased in the child, the retention of these elements would probably be more like that in swine than in rats, because of the greater similarity between man and swine in skeletal maturation, in retention of actinides in liver and their longer life span. These studies suggest a need for further information on neonatal absorption of actinides in a large animal species that has a developing GI function more similar to that of humans.

10903 **Plutonium--its behavior in natural water systems and assimilation by man.** Larsen, R.P.; Nelson, D.M.; Bhattacharyya, M.H.; Oldham, R.D. (Argonne National Lab., IL). *Health Physics;* **44**: No. Sup. 1, 485-492(1983).

There are a number of factors which must be considered in establishing whether or not the inadvertent intrusion of a sizable amount of plutonium-bearing material into a natural water system may have a significant impact on the health of those individuals who use that system as a drinking water resource. These factors include the chemical forms(s) and solubility of plutonium in natural waters, its behavior in relation to natural processes (geochemical and biological), its fate in water treatment systems, and its uptake by man from drinking water. From the results obtained in our investigations of the behavior in natural water systems, it appears that (1) the chemical forms of plutonium dissolved in natural waters are Pu(IV) and Pu(V), (2) the soluble plutonium in many waters is bound to the organic constituents which probably enhances plutonium solubility, (3) the natural process responsible for the removal of plutonium from water is adsorption onto sediments, and (4) in water treatment systems, soluble plutonium is oxidized to the VI state and this form is not removed. From our investigations of gastrointestinal absorption, it appears that the value for f_1, the fraction transferred from the gut to blood, is surely greater than 1×10^{-3} and may be as high as 2×10^{-1}. Consideration of these and other factors indicates that, in the event of an accident, the concentration of plutonium could, in certain small natural water systems, approach and perhaps even exceed, the MPC for plutonium. However, the impact on the health of the affected population would not be inordinately high.

10904 **A tissue distribution model for assessment of human inhalation exposures to $^{241}AmO_2$.** Mewhinney, J.A.; Griffith, W.C. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Health Physics;* **44**: No. Sup. 1, 537-544(1983). Contract AC04-76EV01013.

A model useful for predicting lung retention and tissue distribution following human inhalation exposure to $^{241}AmO_2$ has been formulated. The model is based on inhalation studies in beagles exposed to either monodisperse or polydisperse aerosols of $^{241}AmO_2$. It also describes lung retention for several cases of accidental human inhalation exposure to ^{241}Am adequately. The model incorporates an expression for solubilization of $^{241}AmO_2$ deposited in lung which is based on physiochemical characteristics of the inhaled particles. Comparison of predictions from this model and those of the International Commission of Radiological Protection in ICRP Publication 30 shows some important differences. Lung retention patterns of inhaled ^{241}Am in dogs and humans after inhalation of $^{241}AmO_2$ are very similar and do not conform with predictions of the ICRP 30 model. Although use of the ICRP 30 model for calculation of annual limits of intake produces similar values to predictions made from our model, a more complete assessment of accidental human exposures to $^{241}AmO_2$ and the risk to individual organs can be made using the retention and dosimetry model formulated from these studies in dogs.

10905 **Bioassay model for estimating body burdens of ^{241}Am from excretion analyses.** Griffith, W.C.; Mewhinney, J.A.; Muggenburg, B.A.; Boecker, B.B.; Cuddihy, B.G. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Health Physics;* **44**: No. Sup. 1, 545-554(1983). Contract AC04-76EV01013.

A simple bioassay model for predicting the organ burdens of ^{241}Am from excretion rates is presented for inhalation exposures. The model uses three compartments representing lung, liver and skeleton. The model was developed using data from studies in laboratory animals of inhaled or injected ^{241}Am and was validated for people by comparison to cases of accidental inhalation exposures to ^{241}Am. The data for people have a large amount of variability but indicate that the retention half-time of ^{241}Am in liver is $\sim$ 2 yr and in skeleton is $\sim$ 30 yr. These parameters can be used in the model to estimate body and organ burdens from excretion rates after inhalation of ^{241}Am or the model can be fitted to an individual's measured excretion rates.

10906 **Skeletal retention and distribution of ^{226}Ra and ^{239}Pu in beagles injected at ages ranging from 2 days to 5 years.** Bruenger, F.W.; Smith, J.M.; Atherton, D.R.; Jee, W.S.; Lloyd, R.D.; Stevens, W. (Univ. of Utah, Salt Lake City). *Health Physics;* **44**: No. Sup. 1, 513-527(1983). Contract AC02-76EV00119.

The age at exposure significantly affects the retention and distribution of ^{226}Ra and ^{239}Pu, both of which deposit in the skeleton although in somewhat different patterns. Beagles aged 2 days (neonates), 90 days (juveniles), 18 months (young adults), or 5 yrs (mature) received a single subacute injection of one of these nuclides and were sacrificed serially during a 2-yr interval. Nuclide concentrations in plasma, the skeleton, individual bones and bone sections were determined and retention equations were calculated. The microanatomical skeletal nuclide distribution was studied after fission track or conventional autoradiography. Elimination of ^{239}Pu and its translocation from bone surfaces to the bone volume caused by bone growth and turnover processes were measured. Average radiation doses and dose rates as a function of age at exposure were determined. Initial uptake and retention, skeletal nuclide concentration, proliferative activity of local cell populations and residence time of the nuclide on skeletal surfaces were affected significantly by age at exposure. The effect of these parameters on tumor induction is discussed. This study has provided early retention and distribution data which together with data from a chronic toxicity study will be used to estimate the risk of Pu exposure relative to that of Ra to humans of all ages.

10907 **Radiobiology of pions at LAMPF.** Raju, M.R.; Tokita, N. (Los Alamos National Lab., NM). *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 12, 2133-2136(Dec 1982).

Recent radiobiology data for pion beams used in therapy are presented. The biological systems used were cultured cells suspended in gelatin and intestinal crypt assays. The importance of fast neutrons from pion stars in large treatment volumes is discussed. The data for compensating the depth dose distribution to produce uniform cell killing across the peak region are presented. The changes in biological effectiveness with peak width for pion beams (unlike heavy ions) are small because of fast neutron contribution from pion stars. The need for innovative radiobiology programs to guide high-LET radiotherapy is discussed.

10908 **Molecular and cellular radiobiology of heavy ions.** Tobias, C.A.; Blakely, E.A.; Alpen, E.L.; Castro, J.R.; Ainsworth, E.J.; Curtis, S.B.; Ngo, F.Q.H.; Rodriquez, A.; Roots, R.J.; Tenforde, J. (Lawrence Berkeley Lab., CA). *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 12, 2109-2120(Dec 1982). Contract AC03-76SF00098.

Quantitative studies at the BEVALAC have demonstrated some of the physical and radiobiological factors that promise to make accelerated heavy ions important for the therapy of cancer. The measured physical dose-biological effect relationships allow the safe and effective delivery of therapeutic schedules of heavy ions. Among the charged particle beams available, carbon, neon and helium ions in the "extended Bragg peak mode" have optimal physical and biological effectiveness for delivery of therapy to deep seated tumors. The depth-dose profiles of these beams protect intervening and adjacent tissues as well as tissues beyond the range of the particles. For the treatment of hypoxic tumors, silicon and argon beams are being considered because they significantly depress the radiobiological oxygen effect in the region of the extended Bragg ionization peak. The depth-effectiveness of the argon beam is somewhat limited, however, because of primary particle fragmentation. Silicon beams have a depth-dose profile which is intermediate between that of neon and argon, and are candidates to become the particle of choice for maximizing high LET particle effects. Heavy accelerated ions depress enzymatic repair mechanisms, decrease variations of radiosensitivity during the cell division cycle, cause greater than expected delays in cell division, and decrease the protective effects of neighboring cells in organized systems. Near the Bragg peak, enhancement of heavy particle effects are observed in split dose schedules. Late and carcinogenic effects are being studied. With the newly developed Repair-Misrepair theory we can quantitatively model most observations.

10909 **Pion radiotherapy at LAMPF.** Bush, S.E.; Smith, A.R.; Zink, S. (Univ. of New Mexico, Albuquerque). *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 12, 2181-2186(Dec 1982).

Clinical investigations of pi meson radiotherapy were conducted by the Cancer Research and Treatment Center of the University of New Mexico and the Los Alamos National Laboratory from 1974 until 1982. Two hundred and thirty patients have been treated for a variety of locally advanced primary and metastatic neoplasms. One hundred and ninety-six patients have been followed for a minimum of 18 months. Crude survival data range from 11% for unresectable pancreatic carcinoma to 82% for Stages C and D1 adenocarcinoma of the prostate. Acute tolerance of normal tissues is approximately 4500 pion rad in 36 fractions over 7 weeks. Severe chronic reactions have appeared with increasing frequency after doses in excess of 4000 pion rad.

10910 **In vivo radiobiology of heavy ions.** Phillips, T.L. (Univ. of California, San Francisco); Ross, G.Y.; Goldstein, L.S.; Ainsworth, J.; Alpen, E. *International Journal of Radiation Oncology, Biology and Physics;* **8**: No. 12, 2121-2125(Dec 1982). Contract AC03-76SF01012.

The radiobiology of heavy charged particles has been investigated with various animal systems in vivo at the Lawrence Berkeley Laboratory using the helium beam from the 184″ synchrocyclotron and the carbon, neon, and argon beams from the BEVALAC. Tumor experiments were carried out using the R_1 sarcoma in rats and the EMT6 mouse mammary carcinoma, comparing X rays, carbon ions, neon ions, and argon ions. In vivo normal tissue experiments have been carried out with a wide range of tissues including testis, bone marrow, intestinal crypt cells, lens of the eye, esophagus, lung, and the spinal cord. The induction of dominant lethal mutations after irradiation of the testis was assayed by in vivo embryo culture after in vivo irradiation. Experiments were also done with the Harderian gland tumor induction system.

10911 **Dosimetrie bij totale lichaams bestraling. (Dosimetry with total body irradiation).** Meijer, H. Amsterdam, Netherlands; Amsterdam University (1982). 60p. (In Dutch). Available from Library, KNAW, Kloveniersburgwal 29, 1011 JV Amsterdam (NL).

This report describes an investigation into dosimetry with total body irradiation as used in the treatment of leukemia. A number of aspects of this irradiation technique complicate dosimetry. For instance, the large radiation field required demands a particular geometry for setting up the equipment which is described. In the experiment, in-vivo dosimetry was simulated using an antropomorphic phantom and both LiF thermo-luminescent and Si semiconductor dosimeters. The characteristics of these dosimeters are described, including a study of the theoretical and experimental energy dependence. The measured radiation doses in the pelvis, head and lungs are presented and a protocol is given for radiation doses in the clinical situation. The report is concluded with an appendix of definitions of the principal physical quantities found in the report. (C.F.).

10912 **Simultaneous detection of changes in chromosome number, gene conversion and intergenic recombination during mitosis of Saccharomyces cerevisiae: spontaneous and ultraviolet light induced events.** Esposito, M.S.; Maleas, D.T.; Bjornstad, K.A; Bruschi, C.V. (Lawrence Berkeley Lab., Berkeley, CA). *Current Genetics;* **6**: 5-11(1982). Contract AC03-76SF00098.

A hyperhaploid strain of Saccharomyces cerevisiae disomic for chromosome VII was used to monitor spontaneous and ultraviolet light induced restitution of haploidy (chromosomal loss and/or nondisjunction), mitotic gene conversion and mitotic intergenic recombination. The disomic chromosomal pair incorporates six heterozygous markers, including cyh2/sup r/, distributed on both sides of the centromere. Cycloheximide resistant segregants of spontaneous origin were analyzed to calculate the spontaneous mitotic rates of restitution of haploidy, intergenic recombination and gene conversion that result in expression of the cyh2/sup r/ mutation. Restitution of haploidy was found to be the most common source of spontaneously arising cycloheximide resistant segregants. In constrast, those induced by ultraviolet light resulted most frequently from gene conversion of CYH2/sup s/ to cyh2/sup r/. The chromosome VII hyperhaploid system provides a sensitive method to detect the aneugenic and recombinagenic effects of suspect chemical and physical agents.

10913 **Advies inzake categorieen voedselbestraling. (Advice concerning categories of food irradiation).** Leidschendam, Netherland; Ministerie van Volkagezondheld en Milieuhygiene (1981). 53p. (In Dutch). Available from Library, KNAW, Kloveniersburgwal 29, 1011 JV Amsterdam.

This report is the result of an investigation into the acceptability of using 3 kGy radiation doses for food irradiation without having to test every product for wholesomeness. Criteria for the acceptability can be developed, thus avoiding costly and time consuming investigations by the combination of radiochemical calculations and morphological analogy. If sufficient data are available on the chemical composition of food items cleared by "classical" wholesomeness testing, the radiochemical approach may contribute considerably to assess the acceptability of analogous food products or of the same food products under different radiation conditions. However, the chemical and morphological compositions of the food first have to be determined accurately, and a number of recommendations are presented for the properties to be included in the description of foodstuffs.

5602 Thermal Effects

REFER ALSO TO CITATION(S) 10754, 10848

10914 **(PB—83-264523) Thermal effects on bluegill hematology. Final report.** Murray, S.A. (Tennessee Valley Authority, Muscle Shoals, AL (USA). Office of Natural Resources). Mar 1983. 54p. NTIS, PC A04/MF A01.

Temperature effects on hematological responses of adult bluegill were examined for constant vs fluctuating temperature regimes, for ambient vs high temperature, and for intake vs discharge at an operating power plant. Multivariate statistical methods were used to determine temperature effects. An increased erythrocyte fragility was associated with fluctuating temperature regimes as well as with the suboptimal temperature regime. Thrombocytosis with a concomitant leukopenia was observed for the higher fluctuating and higher acclimating temperatures. Reduced erythrocytic sedimentation rates were observed for the higher temperatures. Although hematology may vary depending on fish size, good hematological indicators of potential thermal stress were associated with red blood cell morphology, particularly cell size and/or shape. However, in situ hematological responses of bluegill at an operating

power plant were apparently not affected by the associated thermal gradients.

10915 **Picosecond fluorescence kinetics in spinach chloroplasts at low temperature.** Reisberg, P.; Nairn, J.A.; Sauer, K. (Lawrence Berkeley Lab., Univ. of California, Berkeley). *Photochemistry and Photobiology;* **36**: 657-661(1982). Contract AC03-76SF00098.

At 77K the fluorescence from spinach chloroplasts excited using picosecond mode-locked laser pulses at 620 nm is made up of 5 separate kinetic components. Three of these are predominant at short wavelengths, between 650 and 690 nm, and they appear to correspond to the 3 decay phases seen at room temperature. The 2 new components, a 100 ps rise and a 3000 ps decay, characterize the longer (730-770 nm) wavelength fluorescence. The temperature dependence of the kinetic components of the long wavelength fluorescence shows that the 3000 ps decay accounts for essentially all of the large increase in fluorescence yield observed at low temperature. Furthermore, it appears that this increase does not result entirely from an increase in the fluorescence lifetime, as has been proposed. The dependences of these 2 new components (the 100 ps rise and 3000 ps decay) on emission wavelength and temperature are similar enough to suggest they have a common origin, presumably the chlorophyll pigment component C705. The amplitudes (yield/lifetime) of these 2 phases are approximately equal, and they are opposite in sign. Thus, we see evidence of time-resolved excitation transfer from those pigment molecules that absorb the 620 nm radiation to those that give rise to the long wavelength fluorescence at low temperature.

5603 Chemicals Metabolism And Toxicity

REFER ALSO TO CITATION(S) 9287, 9316, 9317, 9318, 9319, 9347, 10649, 10653, 10657, 10742, 10742, 10762, 10768, 10843, 10844, 10848

10916 **(BNL—51729) Biological effects summary report di(2-ethylhexyl) sebacate.** Silverstein, B.D.; White, O. Jr.; Brower, J.E.; Bernholc, N.M. (Brookhaven National Lab., Upton, NY (USA)). Oct 1983. Contract AC02-76CH00016. 13p. NTIS, PC A02/MF A01. Order Number DE84005624.

An evaluation of the health effects of di(2-ethylhexyl) sebacate (DEHS) was made to assess its potential use as substitute for di(2-ethylhexyl) phthalate (DEHP), which is used as a test aerosol in quantitative fit testing of respirators. A review of published and unpublished information on toxicity of DEHS was made. The limited amount of data on DEHS indicated that it has a low level of toxicity to laboratory animals. No oral or inhalation toxicity studies on humans were found, but skin sensitization and irritation studies were negative. Insufficeint data exists at present to permit determination of DEHS carcinogenicity. Because of structural similarities of DEHS to DEHP and di(ethylhexyl) adipate, and because these latter two materials have been shown to be carcinogenic in rats and mice, DEHS is not recommended at this time as a DEHP substitute until lack of its carcinogenic potential is confirmed.

10917 **(CONF-831258—3) DNA target sites associated with chemical induction of dominant-lethal mutations and heritable translocations in mice.** Generoso, W.M.; Cain, K.T.; Cornett, C.C.; Cacheiro, N.L.A. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 19p. NTIS, PC A02/MF A01. Order Number DE84004544.

From 15. international congress of genetics, satellite symposium on mutagenesis: basic and applied; Darbhanga, India (22 Dec 1983).

In male meiotic and postmeiotic germ cells certain alkylating chemicals induce both dominant lethals and heritable translocations effectively while others induce primarily dominant lethals. Production of these two endpoints appears to be determined by the stability of alkylation products in chromosomes. If reaction products are intact in male chromosomes at the time of sperm entry, they maybe repaired in fertilized eggs, or else, they persist to the time of pronuclear chromosome replication and lead to chromatid-type aberrations and lethality. Production of heritable translocations, on the other hand, requires a transformation of unstable alkylation products into suitable intermediate lesions. These are then converted into chromosome exchanges (both symmetrical and asymmetrical) after sperm enters the egg but prior to the time of pronuclear chromosome replication (i.e., chromosome-type aberration). Thus, dominant lethals result from both chromatid- and chromosome-type aberrations while heritable translocations result primarily from the latter type. Heritable translocations appear to be associated with alkylation at the nitrogen positions and dominant lethals with alkylation at various sites, including nitrogen and oxygen of bases and of the phosphate backbone.

10918 **(CONF-8310240—1) Acid rain and tree physiology: an overview of some possible mechanisms of response.** McLaughlin, S.B. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 10p. NTIS, PC A02/MF A01. Order Number DE84003323.

From Symposium on air pollution and the productivity of the forest; Washington, DC, USA (4 Oct 1983).

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Several concepts which should be considered in addressing likely mechanisms by which acid deposition and air pollution in general can affect plant productivity are briefly discussed. These include: (1) multiple components of natural terrestrial systems may be affected; (2) plant response must be examined from a whole-plant perspective; (3) sensitivities of shoots and roots may differ markedly; (4) changing environmental availability and potential phytotoxicity of several trace elements should be examined; and (5) air pollution constitutes only one of many stresses which may contribute to forest declines. 6 references, 3 figures, 2 tables. (ACR)

10919 **(CONF-8310242—1) Role of toxicological interactions in chemical carcinogenesis.** Witschi, H. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 17p. NTIS, PC A02/MF A01. Order Number DE84003322.

From 2. international meeting of chemical carcinogenesis: xenobiotics and biotransformation; Alghero, Italy (11 Oct 1983).

Toxicological interactions may occur not only when exposure to two or more chemicals is simultaneous, but also when exposures are separated in time. Often the sequence of exposure determines the nature of the toxicological response. This is illustrated with the two hindered phenolic antioxidants, butylated hydroxytoluene (BHT) and butylated hydroxyanisole (BHA). Evidence available suggests that in certain tissues exposure to BHT first and then to a carcinogen is without significant consequences, whereas exposure to BHT after a carcinogen may enhance tumor formation. On the other hand, exposure to BHA before carcinogen administration often has a protective effect, whereas exposure to BHA after a carcinogen sometimes protects and sometimes is without any influence. Mechanisms underlying these interactions may be induction of mixed function oxidases, production of cell hyperplasia or other, as yet ill-defined, events such as modification of biological reactivity.

10920 **(DOE/ER—0185) Research in progress: FY 1984. Summaries of projects sponsored by the Office of Health and Environmental Research.** (USDOE Office of Energy Research, Washington, DC. Office of Health and Environmental Research). Dec 1983. 428p. NTIS, PC A19/MF A01. Order Number DE84004219.

This report provides a compilation of summaries of the research projects supported by the Office of Health and Environmental Research (OHER) during Fiscal Year 1984. OHER is a component of the Office of Energy Research within the US Department of Energy, responsible for developing a comprehensive understanding of the health and environmental effects of energy technology development and use as well as other Departmental operations. The OHER program is broad in scope and diverse in character with substantial commitments to both applied and basic research. The research projects have been organized to reflect the major themes and focus of the OHER program. Each research category is preceeded by a short narrative to provide some perspective of the scope of activities which follow. Within each research category, the summaries are organized by efforts performed in DOE laboratories (onsite laboratories) and those performed elsewhere (offsite contractors) to help characterize their respective role in the program. The compilation of project titles and summaries, despite its volume, is still a relatively superficial source of information. It does not provide a sound basis for considering program quality or even relevance.

10921 (IAEA-TECDOC—289, pp 19-21) **Mutagen-induced chimerism in dicotyledonous plants.** Constantin, M.J. (Tennessee Univ., Knoxville (USA). Dept. of Botany). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Short communication only.

10922 (IAEA-TECDOC—289, pp 25-29) **Handling of the first and second generations following mutagenic treatment of seeds in dicotyledonous plants.** Bhatia, C.R.; Abraham, V. (Bhabha Atomic Research Centre, Bombay (India). Biology and Agriculture Div.). Jun 1983. NTIS (US Sales Only), PC A04/MF A01. (CONF-8111183—).

From Meeting on chimerism in irradiated dicotyledonous plants; Vienna, Austria (30 Nov 1981).

Short communication only.

10923 **(KHM-TR—62) Effects of coal and oil fly ash on sister chromatid exchange (SCE) in a macrophage like cell line.** Andersen, O. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Feb 1983. 33p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751382.

The present study attempted direct measurements of genotoxic effects of particulate coal and oil combustion products using the $P388D_1$ macrophage cell line. The capability of these cells for phagocytosis was demonstrated using insoluble particles. The SCE (sister chromatid exchange) test was used for measuring genotoxic effects. The $P388D_1$ cell line does not metabolize latent organic carcinogens. A sample of precipitated coal fly ash (from an electrostatic precipitator downstream of a cyclone at an electricity generating plant burning pulverized coal) had a clear increasing effect on SCE in $P388D_1$. Emission samples taken with impactor sampler after a dilution probe using controlled cooling of the flue gas were obtained from 2 oil fired and 2 coal fired plants. At one of the coal fired plants the particle emission was size fractionated (< 3 um and > 3 um). The only sample increasing SCE significantly was the sample < 3 um from a coal fired plant. The two other coal fired samples had a weak (not statistically significant) effect on SCE. The two samples from oil fired plants did not increase SCE. The results obtained with the size fractionated emission from a coal fired plant indicate that the fraction with particle size < 3 um may contain potentially carcinogenic compounds, and that the smaller particles are most genotoxic, in agreement with other studies. This emphasizes the importance of size fractionation during sampling of particulate air pollution, since biologically important genotoxic effect of the respirable part of emissions may be diluted and thus underestimated or even remain undiscovered when total samples are assayed.

10924 **(KHM-TR—64) Effects of metal compounds on chromosome length.** Andersen, O. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 42p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83751389.

Summary in Danish.

In the present report spindle-inhibiting effects in human perihereal lymphocytes after in vitro exposure to coal fly ash and to compounds of heavy metals often present in coal fly ash has been sought evaluated indirectly by chromosome length measurements. The results demonstrated that the reduction in average chromosome length induced by invitro exposure to Cdsup ++ and Hgsup ++ are transient, and during long-time exposures prevented, most likely by induction of metallothionein and intracellular complex formation. The effects of CH_3Hgssub + on chromosome length is stable for a considerable period of time, suggesting that intracellular CH_3Hgsup + is not detoxified by metallothionein complex formation. These compounds, as well as organic and inorganic lead compounds, Nisup ++, Cosup ++, Mnsup ++, As_{O_3}- and Se_{O_3}-- significantly - changed chromosome length distributions toward smaller average chromosome length, indicating spindle-inhibiting effects. In vitro exposure to coal fly ash from an electrostatic precipitator induced a dose-dependent reduction in average chromosome length, and a large number of C-mitoses were observed on slides from fly ash treated cultures, not exposed to colchicin, indicating spindle-inhibiting effects. Both the metal content of single coal fly ash particles and the dose retained in different cells after in vitro exposure to fly ash have been demonstrated to vary considerably. Thus, it is possible that coal fly ash deposited in the lungs may be able to affect the spindle function in target cells. A systemic effect seems unlikely although additive or synergistic effects due to complex exposures or simultaneous exposures through different routes cannot be excluded.

10925 **(KHM-TR—81) Kidney injuries and cadmium. Riskestimation concerning kidney injuries due to cadmium exposure.** Holmberg, I. (Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE). Mar 1983. 60p. (In Swedish). Statens Vattenfallsverk, Vaellingby, Sweden, Projekt KOL-HAELSA-MILJOE.

A model system has been employed to study cadmium generated minor tubular kidney injuries. The system consists of three sub-models: A metabolic model that describes the accumulation of cadmium, primarily in the kidney cortex, a distribution model that describes how the cadmium concentration varies among individuals, and, finally, a risk-model that relates critical concentrations of cadmium to the risk of an injury to the kidney. At this stage of the investigation it has not been possible to acquire any quantitative information concerning the relation between use of coal and its direct and indirect effect on the presence of cadmium in the environment. The different levels of daily cadmium intake have been chosen so as to represent, in the model calculations, a possible range of variation. The number of injuries at different levels of the daily intake of cadmium and for certain specified risk-groups has been calculated. The increase in the absorption of cadmium in the G.I. tract, caaused by anemia, appears to be of great importance for the frequency of injuries. Smokers have a 10 to 30 per cent higher frequency of injuries than non-smokers. A yearly increase in the cadmium intake of 1 per cent will, in the long term, lead to a two to three times as large increase in the average frequency of injuries. Both direct and indirect effects of an increased use of coal as an energy source will have only a minor impact on the environment according to the studies. To this contributes not only the use of relatively pure coal, but also the very strong demands on the purification of the smoke outlets.

10926 **(LA-UR—83-3583) Particulate oil shale inhalation and pulmonary inflammatory response in rats.** Wilson, J.S.; Holland, L.M.; Halleck, M.S.; Martinez, E.; Saunders, G. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 23p. (CONF-8309189—1). NTIS, PC A02/MF A01. Order Number DE84004319.

From 11. international congress on occupational health in the chemical industry; Galgary, Canada (26 Sep 1983).

This experiment detrimetal that long-term inhalation of shale dusts by rats elicits a limited inflammatory response in the lung less profound than that observed in animals exposed to equivalent levels of quartz alone. This observation suggests that organic and inorganic constituents of shale may provide a protective effect. The implications for fibrogenic disease are two-fold: (1) inhalation of oil shale dusts appeared to be less detriemtal than the inhalation of quartz along, and (2) there was no apparent synergistic action of quartz and the complex of organic materials present in shale. Animals exposed to shale dusts failed to develop any significant lung lesions, while all of the animals exposed to quartz developed granulomas and some frank fibrosis.

10927 **(NP—4770114) Liver alterations in halogenated hydrocarbons intoxication during hyperventilation therapy.** Gellert, J. (Duesseldorf Univ. (Germany, F.R.). Medizinische Fakultaet). 1980. 106p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84770114.

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Within the scope of the present study 22 patients were investigated, who came to stationary treatment after oral uptake or inhalation of different halogenated alipathic hydrocarbons. In all patients a CO_2-induced hyperventilation treatment was performed in order to increase pulmonary elimination of the toxic substances. The lethality rate of little below 7% clearly ranges below the rate of 50% observed under conventional treatment. Over the whole

period of treatment the enzyme activities of GOT, GPT, G1DH, AP, LAP and GGT were determined in serum samples. During the first 14 d characteristic activity curves resulted for the individual intoxications; transaminases and glutamate dehydrogenases resulted to be markers applicable for evaluating the course of the treatment. In 18 patients the liver could be examined histologically after the hyperventilation therapy had been finished. In 4 patients the liver was examined with an electron microscope. The results of the biochemical, histologic and electrone-microscopic examinations show that serious liver damages due to intoxication with halogenated hydrocarbons may be prevented by performing a CO_2-induced hyperventilation therapy, if the therapy can be carried out over a sufficient period and the liver has not been damaged in advance.

10928 **(NP—4770116) Acid rain and damage in forestry.** (Gesamtverband des Deutschen Steinkohlenbergbaus, Essen (Germany, F.R.)). Apr 1983. 152p. (In German). NTIS (US Sales Only), PC A08/MF A01. Order Number DE84770116.

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In general, the co-action of various air contaminations (synergism) is mentioned as the cause of damage in forests. The joint occurrence of air pollutants (e.g. SO_2, ozone, acid rain) leads to damaged leaf surfaces in conifers and deciduous trees resulting in an eluviation of the trace elements Mg or K. According to the view held by the Gesamtverband, the participation of individual or of the total of airborne pollutants cannot be regarded as the only cause of forest mortality. They think that other components like e.g. diseases, soil conditions, fungus infestations, drought years and mono-cultures, are just as responsible.

10929 **(NP—4770117) Studies of mercury content of indoor air, blood and urine in clinical and medical dental practice.** Hamm, M. (Muenchen Univ. (Germany, F.R.). Fachbereich Medizin). 7 Oct 1982. 115p. (In German). NTIS (US Sales Only), PC A06/MF A01. Order Number DE84770117.

Portions are illegible in microfiche products.

In 4 patient groups comprising in total 96 persons (37 assistants, 29 dentists in private practice, 10 assistant dentists and students from the Ambulant Clinic for Dental Maintenance and Paradontology and 20 control persons) whole blood samples and spontaneous urine samples were investigated for Hg contamination. In addition, the Hg concentrations in the dentists' surgeries were measured. It has to be noted that the indoor concentration measurements were performed under normal treatment conditions at the breathing level of dentist and assistants. These concentrations mostly ranged between 3 and 12 $\mu g\ Hg/m^3$ air and were present at this level only for a short time during the administration of fillings. The Hg mean values of the urine referred to creatinine found in the assistants, were 3.5+-1.7 μg Hg/g creatinine and thus ranged slightly above the control group which provided 2.8+-1.5 μg Hg/g creatinine; for the dentists a mean value of 2.3+-0.7 μg Hg/g creatinine and for the students 2.1+-2.0 μg Hg/g creatinine was measured. The Hg values in the spontaneous urine samples of assistants and dentists were approximately 4.4 μg Hg/l urine (average) and thus were slightly increased compared to those found in the control persons whose mean value was 4.1+-1.1 μg Hg/l urine.

10930 **(NP—4770118) Systematic studies of the effect of aggressive gases on sprucewood.** Besold, G. (Muenchen Univ. (Germany, F.R.)). 19 Jul 1982. 146p. (In German). NTIS (US Sales Only), PC A07/MF A01. Order Number DE84770118.

Portions are illegible in microfiche products.

Sprucewood bars were treated over a period of 336 days with formaldehyde, ammonia, sulfur dioxide, and chlorine with due consideration of practical parameters. By three extraction stages (water, ethanol-benzol, alkali), decomposition products of the wood components were extracted and, finally, the wood residues and extracts analysed. Besides the long-time experiments sorption tests were carried out giving information on the course of sorption in relation to time and the humidity of the wood and yielding defined samples for physico-mechanical investigations. Summing up the results obtained, the treatment with formaldehyde, ammonia, sulfur dioxide and chlorine provokes the following modifications in the cell wall components: - CH_2O: slight decomposition of polyoses; cross-linking reactions in the polysaccharide sector, thereby increase in the degree of polymerization and tensile strength, - NH_3: decomposition of lignin; stabilization of polyoses and alterations in the crystalline cellulose sector account for an increase in the elasticity modul and tensile strength, - SO_2: marked decomposition of polyoses and, to a small extent, of cellulose; decomposition of lignin; the tensile strength is considerably reduced by the long-term action, - Cl_2: very marked decomposition of polyoses and lignin and strong decomposition of cellulose accounting for a substantial decrease in the degree of polymerization and tensile strength. With the aid of the investigation results it was possible to set up an investigation and evaluation diagram.

10931 **(NUREG/CR—3477) Concentrations of copper-binding proteins in livers of bluegills exposed to increased concentrations of soluble copper.** Harrison, F.L.; Lam, J.R. (Lawrence Livermore National Lab., CA (USA)). Sep 1983. Contract W-7405-ENG-48. 27p. (UCRL—53487). NTIS, PC A02/MF A01. Order Number DE84005146.

We conducted experiments to determine the concentrations of copper in effluents and the durations of chronic exposure to sublethal levels of copper that bluegills can tolerate without adverse effects. Groups of young bluegills (6 to 8 cm) were exposed in 760-L tanks to water regulated to pH 5.5 that contained either no additional copper or 20, 40, 80, or 160 μg/L additional copper. In one tank, water was regulated to pH 7 and the copper to 80 μg/L. Liver metalloproteins from the bluegills were separated into a low molecular-weight (LMW) protein fraction, which contains metallothioneins (MTs), and into intermediate molecular-weight (IMW) and high molecular-weight (HMW) fractions, which contain metalloenzymes (MEs), using high performance liquid chromatography. Large differences in quantities of copper associated with metalloproteins were found. Copper concentrations in the LMW, IMW, and HMW protein fractions and in the pellet (insoluble fraction) increased with increased exposure concentration and time. Concentrations of copper in the LMW protein fraction and pellet of bluegills exposed to 160 μg Cu/L appeared to plateau with long exposure times whereas those in the HMW protein fraction appeared to increase exponentially. Mortality was dependent on exposure concentration and duration and appeared to be correlated with the saturation of the MT-detoxication capability.

10932 **(OEFZS-LA—109/82) Concentration of heavy metals in water plants of some Austrian running waters.** Ledl, G.; Horak, O.; Janauer, G.A. (Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H.). Feb 1982. 13p. (In German.). Oesterreichisches Forschungszentrum Seibersdorf G.m.b.h., Vienna (Austria).

Also published in Acta Hydrochim. Hydrobiol. (1981) v. 9(6) p. 651-663.

Austrian waters plants were sampled and analyzed by means of atomic absorption spectrometry to their contents of Fe, Mn, Zn, Cu, Ni and Cd. The highest values were found for Fe and Mn. High variations occurred which are explained by geochemically different conditions in sediments. The contents of Zn ranged between 40 and 200 μg/g TS but sporadicly exceeded those of Fe and Mn. The values for Cu were between 5 and 20 μg/g TS, those for Ni mostly between 1 and 8 μg/g TS. For Cd the lowest contents (less than 1 μg/g TS) were found. With some rivers a clear sequence of elements is noticed: Fe > Mn > Zn Cu > Ni > Cd. In plants of polluted waters, sporadiealy strongly increased values of all elements were found. The different heavy metal concentrations in plants don't depend on the environmental conditions but are species-specific. A clearly recognizable element and species specificity was shown at the calculation of enrichment factors. These range between 10^3 and 10^5 thus elements have varying concentrations. Beside the water moss fontinalis antipyretica elodea canadensis, ranunculus aquatilis agg., ranunculus fluitans and myriophyllum verticillatum concentrate most heavy metals strongest.

10933 **(ORNL/TM—8881) Acute, chronic and reproductive effects of petroleum and two petroleum substitutes on the large milkweed bug, Oncopeltus fasciatus.** Merchant, E.R.; Walton, B.T. (Oak Ridge National Lab., TN (USA)). Dec 1983. Contract W-7405-ENG-26. 69p. NTIS, PC A04/MF A01. Order Number DE84005078.

Thesis. Submitted by E.R. Merchant to Univ. of Tennessee, Knoxville.

Effects of petroleum and two synthetic oils on mortality and reproduction of the large milkweed bug, Oncopeltus fasciatus (Dallas), were compared. Reproduction was investigated because of its importance in the maintenance of population levels and the sensitivity of the reproductive system to toxicants. Adult milkweed bugs were dosed topically with the test oils to measure acute toxicity. Chronic toxicity was determined by mean survival after chronic exposure, starting with the fifth instar. The ability of sublethal levels of the test oils to affect reproduction was measured by the number of eggs laid and their percent hatch. The two synthetic oils were found to be more acutely and chronically toxic than petroleum. Egg production was not affected by petroleum but was reduced approximately 20% by sublethal levels of both synthetic oils. Egg viability was not affected.

10934 **(PNL-SA—11763) Estimated health effects from a regionwide weatherization program.** Sandusky, W.F.; Craig, R.A.; Cross, F.T.; Sever, L.E.; Parker, G.B. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 11p. (CONF-8311122—1). NTIS, PC A02/MF A01. Order Number DE84003959.

From 20. annual meeting of PNWIS-APCA; Seattle, WA, USA (16 Nov 1983).

The Pacific Northwest Laboratory (PNL) has prepared a Draft Environmental Impact Statement (DEIS) for the Bonneville Power Administration (BPA) proposed expanded regionwide residential weatherization program. One aspect of the DEIS was to estimate regionwide health effects resulting from increased levels of radon, formaldehyde, and Benzo-a-pyrene (BaP) that may occur in various residence types. To do this, a simple modeling technique was used in conjunction with data from a survey of regional housing stock. Our results indicated that for the BPA residential service region (Oregon, Washington, Idaho, and western Montana) between 8 and 9 additional lung cancers per year above the current level (113 to 114 lung cancers per year) are estimated to occur. The above value is based on assumption that 85% of those homeowners not currently eligible to receive tightening measures would actually participate in the program. If the participation rate is 50 to 55%, then between 4 and 5 additional lung cancers per year are estimated to occur. Described in this paper are the modeling techniques, assumptions, and data used to obtain the above noted values. Also provided is information for the present weatherization program being implemented by BPA and relative uncertainty associated with each estimated health effect value.

10935 **(UCRL—88687) Partitioning of copper among copper-binding proteins in the mussel Mytilus edulis exposed to soluble copper.** Harrison, F.L.; Lam, J.R. (Lawrence Livermore National Lab., CA (USA)). Dec 1983. Contract W-7405-ENG-48. 28p. (CONF-8310230—1). NTIS, PC A03/MF A01. Order Number DE84004361.

From Environmental health aspects of estuarine research symposium; Virginia Beach, VA, USA (22 Oct 1983).

Partitioning of copper among copper-binding proteins was evaluated in digestive glands of Mytilus edulis exposed to soluble copper. Groups of mussels were held in flow-through bioassay systems and exposed to either ~ 1 (control) or 25 μg Cu/L for as long as 21 weeks. At 3-week intervals, groups of 25 mussels were removed and the digestive glands were analyzed for copper-binding proteins by gel-permeation chromatography and atomic absorption spectrometry. Chronic exposure to copper resulted in increased amounts of copper in the low molecular-weight (LMW) protein fraction, which contains metallothionein-like proteins, and in the high molecular-weight (HMW) protein fraction, which contains metalloenzymes. Concentrations of copper in the LMW protein fraction increased and then appeared to plateau with long exposure times, whereas those in the HMW protein fraction continued to increase with exposure time.

10936 **An algal assay method for determination of copper complexation capacities of natural waters.** Allen, H.E.; Blatchley, C.; Brisbin, T.D. (Illinois Inst. of Technology, Chicago). *Bulletin of Environmental Contamination and Toxicology;* **30**: No. 4, 448-455(Apr 1983). Contract W-31-109-ENG-38.

The complexation capacity of natural waters was determined by the Davey method using a green alga and compared to that determined by plotting the free copper ion concentration versus the growth rate. Results show that the complexation capacities determined by each method were statistically the same. However, these two methods differ in an important way. For Davey's method only those data in the vicinity of the equivalence point are used. For the biological titration all data can be used if the complex is strong. For weaker complexes, the data for total metal concentrations similar to that of the complexation capacity will deviate from linear behavior. In these cases the data which deviate can be disregarded. The biological titration method is easier to use because it does not require that a significant number of samples have metal concentrations similar to the value of the complexation capacity. (JMT)

10937 **Sensitivity of Drosophila melanogaster to low concentrations of gaseous mutagens. IV. Mutations in embryonic spermatogonia.** Kale, P.G.; Baum, J.W. (Brookhaven National Lab., Upton, NY). *Mutation Research;* **113**: 135-143(1983). Contract AC02-76CH00016.

Drosophila embryos were treated with gaseous ethylene dibromide at concentrations ranging from 0.26 to 200 ppm, thereby exposing a homogeneous and non-dividing population of primordial spermatogonia. Mutations were induced at exposures as low as 1 ppm for 3 h indicating the sensitivity of spermatogonia and the usefulness of this life-cycle stage for detection of mutagens. Other advantages of using embryos are also discussed. The relations between exposure vs. percentage of mutations per chromosome tested and vs. percentage of positive males were linear at low exposures indicating the possibility of extrapolation of the data to very low doses and lack of a threshold. For some males 50% of the progeny carried a mutation, and mutations continued to appear in all tested broods providing evidence of damage to stem cells undergoing quasidichotomous divisions. Damage to the stem cells is important in terms of total effects on the gene pool and may contribute more mutations than that due to damage in the more sensitive spermatocytes and spermatids. Spermatogonial stages, therefore, should also be considered in mutagen screening and risk-benefit analyses.

10938 **Localization of specific lesions in dimethylbenz(a)anthracene-preexposed tracheal explants.** Marchok, A.C. (Oak Ridge National Lab., TN); Nettesheim, P.; Johnston, W.W. *American Journal of Pathology;* **109**: No. 3, 321-329(Dec 1982). Contract W-7405-ENG-26.

An experimental model is described for separating out and identifying, by a nondestructive method, lesions induced in rat tracheal implants exposed to 200 μg dimethylbenz(a)anthracene (DMBA)-beeswax pellets. The approach was to cut exposed and nonexposed tracheas into 2 x 3-mm explants and place them in organ culture for 24 hours. The medium was collected, and the exfoliated cells in the medium were stained by the Papanicolaou method for cytologic diagnosis. The exfoliated cells were graded according to the degree of atypia by conventional cytologic criteria. To validate the cytologic diagnoses, 60 organ cultures were fixed, sectioned, and stained; and the histopathologic diagnoses were compared. In most cases, the cytologic findings were predictive of the histopathologic results. To test for alterations in growth characteristics of cell populations derived from specific lesions, epithelial cell cultures were established from 35 organ cultures. All primary cultures from explants showing moderate or more severe atypia, and 40% from those showing regular metaplasia or mildly atypical lesions, survived and grew in culture. Cultures from unexposed tracheas did not survive.

10939 **Effect of carcinogen release rate on the incidence of preneoplastic and neoplastic lesions of the respiratory tract epithelium in rats.** Shiba, M. (Univ. of Tennessee, Oak Ridge); Klein-Szanto, A.J.P.; Marchok, A.C.; Pal, B.C.; Nettesheim, P. *JNCI, Journal of the National Cancer Institute;* **69**: No. 5, 1155-1161(Nov 1982). Contract W-7405-ENG-26.

Inbred F344 rat tracheal transplants were exposed to 7,12-dimethylbenz[a]anthracene (DMBA) delivered at different release rates from intraluminal pellets made of various matrices to study the effect of carcinogen dose rate on the induction of lesions in the

epithelium. These matrices were beeswax, beeswax-stearyl alcohol, and beeswax-cholesterol. In addition, DMBA adsorbed onto carbon particles was dispersed in beeswax-stearyl alcohol. The fastest release was obtained from beeswax pellets from which 99% of the carcinogen (198 μg) was released in 4 weeks, and the slowest release was from DMBA adsorbed on carbon at a ratio of 1:9 from which only 56% (113 μg) was released in 16 weeks. Morphometry of histologic sections showed marked differences in the percentage of luminal surface covered by dysplastic-neoplastic epithelium (i.e., 7.5% in the tracheas exposed to the fastest releasing pellets and 46.3% in the tracheas exposed to the slowest releasing pellets). An inverse linear correlation was found between the cumulative amount of DMBA release from the different pellet matrices at 2 weeks and the incidence of dysplastic plus neoplastic lesions of tracheal epithelium at 16 weeks. The results indicated that lower doses of carcinogen delivered slowly are more effective in producing dysplastic plus neoplastic lesions than higher doses delivered rapidly.

10940 **Dose-dependent disposition of ethylene glycol in the rat after intravenous administration.** Marshall, T.C. (Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM). *Journal of Toxicology and Environmental Health;* **10**: No. 3, 397-409(Sep 1982). Contract AC04-76EV01013.

A dose-dependent change was observed in the disposition of ^{14}C-labeled ethylene glycol (EG) after iv administration of 20, 200, 1000, and 2000 mg/kg to Fischer 344 rats. The part of the dose expired as CO_2 decreased from 39% at 20 and 200 mg/kg to 26% at 1000 and 2000 mg/kg, while urinary excretion of radiocarbon increased from 25 to 56%. The increase in urinary ^{14}C was almost entirely attributable to [^{14}C]glycolate, which comprised 20% of the dose in 24 h at the two higher dose levels and only 2% at the lower doses. High doses of EG limited the processes responsible for glycolate metabolism, supporting the idea that this acid is a major contributing factor to the acute toxicity of EG. Compensatory urinary excretion of glycolate resulted in minimal dose-dependent effects on ^{14}C blood clearance. Blood clearance of ^{14}C occurred in an initial rapid phase (half-life, 3-5 h), when plasma was comprised predominantly of ethylene glycol, that persisted for 12 h at 20 mg/kg EG and 30 h at 2000 mg/kg. The dose-dependent profile of EG metabolism argues against the use of very high chronic doses in studies intended to estimate health risks of long-term, low-level exposure to EG.

10941 **Acute and genetic toxicity of 1-nitropyrene and its fate after single oral doses to rats.** Marshall, T.C.; Royer, R.E.; Li, A.P.; Kusewitt, D.F.; Brooks, A.L. (Lovelace Inhalation Toxicology Research Inst., Albuquerque, NM). *Journal of Toxicology and Environmental Health;* **10**: No. 3, 373-384(Sep 1982). Contract AC04-76EV01013.

The mammalian acute and genetic toxicity of 1-nitropyrene (NP) was studied because this and other nitroarenes are highly mutagenic toward bacteria and have been identifid in emissions from combustion processes. A suspension of NP did not cause observable signs of acute toxicity and was not lethal when administered to male and female rats at single oral doses at high as 5.0 g/kg. Histological examination of stomach, intestine, lung, heart, spleen, pancreas, adrenal, and kidney from rats euthanized at 4 and 14 d after treatment revealed no detectable differences from control rats. Urine and feces were collected for 4 d after treatment with 5.0 g/kg. About 70% of the dose was present in the feces as NP, and about 2% was present as the reduced metabolite 1-aminopyrene (AP). Sulfate and glucuronide conjugates of AP were present in small amounts (<1%) in the urine, showing that at least some of the dose was absorbed. Bone marrow cells from female rats given NP orally at 0.5, 1.5, and 5.0 g/kg showed a slight dose-related increase in the frequency of sister chromatid exchanges. Both NP and AP showed low mutagenicity in Chinese hamster ovary cells in vitro. Evidence of reductive metabolsm of NP in rats raises concern about the potential exposure of humans to this compound. However, the weak in vivo and in vitro genetic toxicity of NP at high dose level in mammalian systems suggests that the potential hazard may not be as high as predicted from bacterial mutagenicity data.

10942 **Queuine-containing isoacceptor of tyrosine tRNA in Drosophila melanogaster - alteration of levels by divalent cations.** Christie, N.T. (Oak Ridge National Lab., TN); Owenby, R.K.; Jacobson, K.B.; Hiatt, V.S.; Farkas, W.R. *Biochimica et Biophysica Acta;* **699**: 40-48(1982). Contract W-7405-ENG-26.

Dietary cadmium causes the queuine-containing, Q(+), isoacceptors to increase relative to the guanine-containing, Q(-), ones of tRNA/sup Tyr/, tRNA/sup His/ and tRNA/sup Asp/ of Drosophila melanogaster. Of the other divalent cations examined, Sr^{2+}, Ni^{2+}, Cu^{2+}, Zn^{2+} and Hg^{2+}, only Hg^{2+} failed to cause an increase in Q(+)tRNA/sup Tyr/. For these results, all pre-adult stages of the organism were spent on media containing the divalent ions. Adult flies that had developed on a normal diet also responded to divalent ions; Hg^{2+} as well as Cd^{2+}, Sr^{2+} and Zn^{2+} caused an increase in Q(+)tRNA/sup Tyr/ in 4 days. Using adult flies, the rate of the response was measured; when placed on a Cd^{2+} -containing diet, they formed significantly more Q(+)tRNA/sup Tyr/ within 24 h as compared to adults on a normal diet. Whether the queuine is derived from the diet or from de novo synthesis is yet to be determined. Since the metal ions represent a range of values in the 'hard-soft' classification, different sites of reaction are expected, yet for Drosophila a common result is an alteration in the ratio of Q(+) and Q(-) isoacceptors of these tRNAs. The transition to Q(+)tRNA may be an early indication of the metabolic imbalances resulting from the presence of the divalent cation.

10943 **Acute toxicity of methanol in the folate-deficient acatalsemic mouse.** Smith, E.N.; Taylor, R.T. (Lawrence Livermore National Lab., Livermore, CA). *Toxicology;* **25**: 271-287(1982). Contract W-7405-ENG-48.

A study was undertaken to assess whether folic acid deficient (FAD) mice which accumulate formate are much more sensitive to the lethal effects of methanol than folic sufficient (FAS) mice. Moreover, because some formate is oxidized by catalase-H_2O_2 in rodents, but not in primates, a comparison was made of the urinary excretion and blood plasma accumulation of formate and the methanol sensitivity of acatalasemic mice. Results indicate that the plasma formate concentration does not correlate well with methanol lethality in Cs/sup b/-FAS vs. -FAD mice. In addition, urinary excretion, not oxidation, is the primary means by which mice, and probably rats, eliminate high levels of blood formate. Since the Cs/sup b/-FAD mouse attains high plasma formate levels and low blood pH-values similar to those which have been reported for methanol poisoned monkeys, it appears to be of value as an inexpensive small animal model for further studies of lethal methanol toxicity and the contribution of formate to this process. (JMT)

10944 **Gastrointestinal absorption of cadmium in mice during gestation and lactation.** Bhattacharyya, M.H. (Argonne National Lab., IL); Whelton, B.D.; Peterson, D.P. *Toxicology and Applied Pharmacology;* **66**: 368-375(1982). Contract W-31-109-ENG-38.

The effect on cadmium retention of continuous exposure to drinking water containing low levels of cadmium during pregnancy and lactation was studied in mice. Female mice were provided drinking water ad libitum containing $^{109}CdCl_2$ (0.03 μCi ^{109}Cd/ml, 0.11 ppb total cadmium) throughout either gestation, lactation, or a combined period of pregnancy and lactation. Nonpregnant control mice were exposed to the same cadmium solution for similar time periods. Dams in all three experimental groups retained two to three times cadmium (expressed as percentage of ingested dose) than did nonpregnant controls. The ^{109}Cd contents of liver, kidney, mammary tissue, and duodenum increased strikingly in all three groups. Increases in kidney and mammary tissue were particularly apparent during lactation, with increases of fivefold for kidney and at least ninefold for mammary tissue, compared to levels in nonpregnant controls. Increases in ^{109}Cd retention by the duodenum were fivefold during gestation and three- to fourfold during lactation. The kidneys of dams exposed during lactation retained 53% of the whole body ^{109}Cd, while kidneys of nonpregnant controls retained only 27%. Results indicate that pregnant and lactating mice absorb and subsequently retain substantially more cadmium from their diets than do nonpregnant mice.

10945 **Genetic effects of 1,2-dibromo-3-chloropropane (DBCP) in Drosophila.** Kale, P.G.; Baum, J.W. (Brookhaven National Lab., Upton, NY). *Environmental Mutagenesis;* 4: 681-687(1982). Contract AC02-76CH00016.

Induction of sex-linked recessive lethal mutations, heritable translocations and genetic crossing-over were studied in Drosophila melanogaster males treated as adults and as embryos with different concentrations of gaseous DBCP. Adults exposed to 30 ppm/hr of the compound did not produce a significant number of sex-linked recessive lethal mutations in treated spermatozoa, spermatids, or spermatocytes. However, at an exposure of 17.7 ppm/hr, a weak mutagenic effect was observed in embryonic spermatogonia. No translocation was scored in 4032 tested chromosomes from adults treated with 150 ppm/hr. However, a significant number of spermatocytial crossovers were induced after an exposure of 120 ppm/hr.

5604 Other Environmental Pollutant Effects

10946 **(PB—83-259648) Human reactions to ELF electric and magnetic fields: an annotated bibliography of current literature (3rd edition). Final report.** Reilly, J.P. (Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.). Jul 1983. 95p. NTIS, PC A05/MF A01.

The annotated bibliography lists current literature (since 1960) which applies to human reactions to electric and magnetic fields from 10 HZ to 100 HZ, with an emphasis on power frequency fields. This includes direct experimental work with humans, epidemiological studies, work which use animal studies to draw interferences about human reactions, studies concerning human dosimetry, and works which discuss means for human protection. This volume is an updated version of an earlier bibliography, first published in July 1981, and revised in a second edition in July 1982.

10947 **(SIS—1982:2) Administrative norms on radiofrequency radiation for occupationally exposed persons.** Saxeboel, G. (Statens Inst. for Straalehygiene, Oslo (Norway)). 1982. 6p. (In Norwegian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704554.

The report presents a proposal for administrative norms on radiofrequency (RF) radiation for occupationally exposed persons. The norms establish maximum allowable field exposure in a frequency range from 1 MHz too 300 GHz.

10948 **(SIS—1983:2) Examination of radiofrequency radiation in the plastic and furniture industries.** Hannevik, M.; Saxeboel, G. (Statens Inst. for Straalehygiene, Oslo (Norway)). 15 Feb 1982. 40p. (In Norwegian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704555.

Radiofrequency (RF) dielectric sealers and heaters are used to weld, glue or heat plastic or wood materials. During the process the operators can be exposed to high levels of RF-radiation. In the report measurements of the electric and magnetic field strengths in the operator position in 20 facilities are presented. The results are discussed in relation to a radiation protection standard which is under work in Norway. A significant number of devices exposed their operators to fields having an equivalent power density greater than 250 W/M^2 averaged over one second and 10 W/m^2 averaged over one hour. Some means for reducing exposure to the operators are presented.

57 HEALTH AND SAFETY

REFER ALSO TO CITATION(S) 10680, 10920

10949 (CONF-821215—, pp 25-29) **Office of Operational Safety environmental program missions and objectives.** Welty, C.G. Jr. (Dept. of Energy, Washington, DC). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

DOE's environmental protection program mission and objectives are listed and four subprograms are described in detail. The four subprograms include (1) policy, requirements and guidance, (2) communication and coordination, (3) overview, and (4) technical support. 8 figures. (JMT)

10950 (CONF-821215—, pp 323-331) **Risk assessment as a means of evaluating environmental controls.** Dover, S.A. (Rocky Flats Plant, Golden, CO). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

A probabilistic risk assessment is a systematic method for estimating the potential for unwanted or negative consequences resulting from an activity. It can focus on any component, subsystem, or system, from the risk of a single part failure to risk of an unwanted hazardous material release for an entire plant. The end result of a risk assessment is a risk value which can be used to judge the adequacy of an environmental control system, or the cost-effectiveness of a proposed new addition to a system. The risk assessment process will also highlight the most effective environmental controls or new controls that have the greatest impact. The information necessary for a risk assessment is developed by performing Safety Analyses as defined in DOE Order 5481.1A. These safety analyses estimate the probability of human and equipment failures, and the corresponding consequences to the structure, workers and environment. As this paper illustrates, this information could easily be used to evaluate the effectiveness and future needs of environmental control systems. The Safety Analyses and Risk Assessments from the Rocky Flats Plant in Golden, Colorado will be used for this illustration. 4 references.

10951 **(ORNL—5962) Industrial Safety and Applied Health Physics Division, annual report for 1982.** (Oak Ridge National Lab., TN (USA)). Dec 1983. Contract W-7405-ENG-26. 72p. NTIS, PC A04/MF A01. Order Number DE84005080.

Portions are illegible in microfiche products. Original copy available until stock is exhausted.

Activities during the past year are summarized for the Health Physics Department, the Environmental Management Department, and the Safety Department. The Health Physics Department conducts radiation and safety surveys, provides personnel monitoring services for both external and internal radiation, and procures, services, and calibrates appropriate portable and stationary health physics instruments. The Environmental Management Department insures that the activities of the various organizations within ORNL are carried out in a responsible and safe manner. This responsibility involves the measurement, field monitoring, and evaluation of the amounts of radionuclides and hazardous materials released to the environment and the control of hazardous materials used within ORNL. The department also collaborates in the design of ORNL Facilities to help reduce the level of materials released to the environment. The Safety Department is responsible for maintaining a high level of staff safety. This includes aspects of both operational and industrial safety and also coordinates the activities of the Director's Safety Review Committee. (ACR)

10952 **(PB—83-257071) Noise attenuating properties of earmuffs worn by miners. Volume 2. Development of a laboratory procedure for the physical measurement of earmuff attenuation. Open file report 1 Jul 1979-30 Jun 1980.** Stewart, K.C.; Burgi, E.J. (Pittsburgh Univ., PA (USA). Graduate School of Public Health). Jun 1980. 37p. NTIS, PC A03/MF A01.

The purpose of this study was to develop and evaluate, in the laboratory, instrumentation and procedures that might allow for the use of physical measurements of earmuff attenuation that would yield results equivalent to those obtained from psychophysical measures of attenuation. The ultimate goal was to evaluate techniques that might subsequently prove feasible for physical measurement of earmuff attenuation in the field. Instruments currently in use were modified to have a response similar to differences observed in earmuff attenuation as observed in volume 1 of this report. Mining noise spectra were selected and presented to a single subject seated in a diffuse noise field wearing one of the muffs evaluated in the earlier study and fitted with two physical sound measurement systems. A linear system measured the outside noise level and a linear system plus c correction filter measured the inside

noise level. The measurements indicated that under the procedures presented in this report, a laboratory method for measuring earmuff attenuation is feasible and yields results comparable with an extensive psychophysical procedure.

58 GEOSCIENCES

REFER ALSO TO CITATION(S) 9729

5801 Geology And Hydrology

REFER ALSO TO CITATION(S) 9422, 9423, 9424, 9425, 9426, 9427, 9428, 9430, 9433, 9435, 9437, 9438, 9439, 9481, 10969

10953 **(IAEA-R—2259-F) Radioisotope tracer application in surface and groundwater flow measurements. Final report for the period 1 January 1979 - 30 September 1982.** Monev, E. (International Atomic Energy Agency, Vienna (Austria)). Jan 1983. 107p. (In Russian). NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704541.

The "peak to peak" method for measurement of water flow with the use of radioactive tracer was investigated. The theoretical basis for this method has been established. The experiments in the open channel have shown the applicability of the method. Groundwater flow was studied by injection of radioactive tracer into the bore-hole followed by gamma-logging in three different time intervals. Interpretation of gamma lows in terms of filtration velocity in various depths proved to be possible.

10954 **(IAEA-R—2384/F) Research within the coordinated programme on comparison of methods of "age" determination of ground water based on decay of long-lived radioisotopes, especially 32-Si. Final report for the period 1 June 1979 - 31 January 1982.** Clausen, H. (International Atomic Energy Agency, Vienna (Austria)). Jun 1982. 4p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704542.

Groundwater samples from two investigation areas have been analysed for the content of ^{32}Si. The possible presence of ^{32}Si in groundwater indicates that the "younger" component as underground production of ^{32}Si is unlikely. The concentration of ^{32}Si in measured samples except one (shallow groundwater) is low (around measurement error) which may indicate the exchange of silicone between radioactive and "dead" silica in the soil. At this stage the ^{32}Si "dating" method is not feasible for groundwater.

10955 (USGS-PP—1161-A-BB, pp B1-B11) **Precambrian development of an oxygenic atmosphere.** Schopf, J.W. (Univ. of California, Los Angeles). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

It has become rather widely accepted in recent years that (1) during the geologic past, the Earth's atmosphere evolved from an initial anoxic to a later oxygenic state; that (2) this change was a result of the cumulative effects of green plant (i.e., oxygen-producing) photosynthesis; and that (3) the transition occurred during Precambrian, and probably Early Proterozoic, time. Although evidence in support of these views appears to be both more circumstantial and more qualitative than has perhaps been generally appreciated, a broad range of biological (and paleobiological, biochemical, and organic-chemical) data seems to establish that such a transition did in fact occur during the Precambrian as a result of blue-green algal photosynthesis, with geological (and mineralogical) data suggesting a plausible date for the transition of about 2000 million years ago. Nevertheless, it has become increasingly evident that the Earth's early atmosphere was not totally devoid of free oxygen, as had apparently been assumed by many workers. Diagenetic oxidation, to yield such sediments as banded iron-formations and red beds, may thus have occurred on the primitive Earth prior to the advent of oxygen-producing photosynthesizers; if so, the mere presence of such deposits should not be construed as necessarily evidencing the occurrence either of biological activity or of an environment sufficiently oxygenic to have been habitable by aerobic forms of life.

10956 (USGS-PP—1161-A-BB, pp I1-I5) **Examples of possible movement of gold in solution in the Witwatersrand, Ventersdorp, and Transvaal systems.** Whiteside, H.C.M. 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Many South African geologists consider that gold especially, and probably uraninite, as well as other heavy minerals such as zircon, chromite, and diamond, are detrital in the Precambrian quartz-pebble conglomerates of South Africa. It is suggested here that solution of gold and its redeposition elsewhere may have played a part in its enrichment or impoverishment. Two examples of possible solution of gold are cited, and the lack of modern placers associated with auriferous Witwatersrand is briefly discussed.

10957 (USGS-PP—1161-A-BB, pp P1-P4) **Distribution and sedimentary arrangement of carbon in South African proterozoic placer deposits.** Minter, W.E.L. (Anglo American Corp., Welkom, South Africa). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

Carbon, which occurs as grains, films, and thin seams in Witwatersrand Proterozoic placer deposits, is generally confined to carbon-seam reefs that were deposited in distal environments. The distribution of carbon on paleosurfaces, on sedimentary accumulation surfaces like pebble layers, on trough-shaped bedforms of pi-crossbedded units and foresets, and on the winnowed top of placer sediments implies that its growth took place contemporaneously with placer deposition in an aquatic fluvial environment. The areal distribution of carbon seams in distal environments is patchy, and its sparsity or total absence in some areas does not affect either the gold or the uranium content of the placer. High gold and uranium contents that appear to be associated with carbon seams are at the base of the reef because that position represents both the stable consolidated paleosurface upon which the plant material anchored itself and also the surface of bedload concentration.

10958 (USGS-PP—1161-A-BB, pp Z1-Z17) **Basal conglomerates and weathered zones in the Marquette Range Supergroup, Northern Peninsula of Michigan - Age, indications of atmospheric oxygen, and uranium potential.** Cannon, W.F. (Geological Survey, Reston, VA). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The Marquette Range Supergroup is a thick accumulation of sedimentary and volcanic rocks deposited between 2.6 and 1.9 billion years ago. Conglomerates and quartzites that are basal in the sense that they lie directly on Archean rocks, are of three ages, and crop out along a strike length of about 600 kilometers. The conglomerates have been considered possible hosts for uranium ore because of close geographic proximity, approximate age equivalence, and certain lithologic similarities to uraniferous quartz-pebble conglomerates in the Huronian of Canada. To date, no uranium deposits are known in conglomerates of the Marquette Range Supergroup, but extensive cover by glacial deposits is a severe hindrance to exploration. There is a substantial possibility that even large deposits would not be found in outcrop. Radiometric dating suggests that the Marquette Range Supergroup is at least in part younger than the Huronian, but results are not conclusive. The best guess as to correlation is that the lowest units of the Marquette Range Supergroup are equivalent to the uppermost units of the Huronian. Iron-formations and weathered zones near the middle of the Marquette Range Supergroup contain indications of an oxygen-rich atmosphere. A favorable uranium potential for conglomerates of the Marquette Range Supergroup is indicated by the widespread presence of anomalously uraniferous Archean basement rocks, abundant quartz-pebble conglomerate in basal units, uranium concentrations in black slates and iron-formations in slightly younger parts of the supergroup, and monazite-rich placer deposits in some of the quartz-pebble conglomerates.

10959 **Visual classification of very fine-grained sediments: evaluation through univariate and multivariate statistics.** Hohn, M.E. (West Virginia Geological and Economic Survey, Morgantown); Nuhfer, E.B.; Vinopal, R.J.; Klanderman, D.S. *Journal of the International Association for Mathematical Geology;* 12: No. 5, 589-605(1980).

Classifying very fine-grained rocks through fabric elements provides information about depositional environments, but is subject to the biases of visual taxonomy. To evaluate the statistical significance of an empirical classification of very fine-grained rocks, samples from Devonian shales in four cored wells in West Virginia and Virginia were measured for 15 variables: quartz, illite, pyrite and expandable clays determined by X-ray diffraction; total sulfur, organic content, inorganic carbon, matrix density, bulk density, porosity, silt, as well as density, sonic travel time, resistivity, and γ-ray response measured from well logs. The four lithologic types comprised: (1) sharply banded shale, (2) thinly laminated shale, (3) lenticularly laminated shale, and (4) nonbanded shale. Univariate and multivariate analyses of variance showed that the lithologic classification reflects significant differences for the variables measured, difference that can be detected independently of stratigraphic effects. Little-known statistical methods found useful in this work included: the multivariate analysis of variance with more than one effect, simultaneous plotting of samples and variables on canonical variates, and the use of parametric ANOVA and MANOVA on ranked data.

5802 Geophysics

REFER ALSO TO CITATION(S) 9423, 10469, 10967

10960 **(AERE-R—10819) Potential for the application of nuclear techniques in selected developing countries in Africa.** Clayton, C.G. (UKAEA Atomic Energy Research Establishment, Harwell. Nuclear Physics Div.). Feb 1983. 139p. HMSO, London, England £ 6.00.

A survey is presented of the distribution of mineralisation, the intensity of exploration and the principal mining operations in a number of developing countries in Africa. Based on this survey the potential for exploiting the use of nuclear instrumentation and measuring techniques in these countries is assessed.

10961 **(NUREG/CR—3143-Vol.2) Indirect rock mass investigations for optimizing borehole drilling programs. Summary of wave propagation geophysical techniques. Volume 2.** Glass, C.E.; Dudley, D.G.; Howard, A.Q. Jr. (Arizona Univ., Tucson (USA). Dept. of Mining and Geological Engineering). Nov 1983. 318p. NTIS, PC A14/MF A01 - GPO $7.50. Order Number DE84900715.

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Waves, by way of their speed of propagation, interaction with boundaries, and energy loss mechanisms, yield information related to the physical properties of media through which they pass. Measurements of wave characteristics at the ground surface or in boreholes, therefore, provide a means by which to ascertain the geologic properties and internal geometry of a rock mass. Geotomography and wavefront reconstruction (holography) are considered two promising techniques for site investigation and characterization. Of the two, geotomography is treated in detail because of its lower sensitivity to noise, and ease of implementation. Algorithms are presented for both ray-optics geotomography and diffraction geotomography. Although the diffraction geotomography algorithm is more general and more satisfying from a physics standpoint, for large numbers of measurements (typical field situations) the mathematics of the inverse problem implicitly requires source frequencies that approach ray optics behavior. The ultimate conclusion is that, regardless of the algorithm used, one should probe using the highest source frequencies possible for given site conditions. 60 references, 103 figures, 5 tables.

10962 **(NUREG/CR—3552) Canadian Seismic Agreement.** Basham, P.W.; Lyons, J.A.; Drysdale, J.A.; Shannon, W.E.; Andersen, F.; Hayman, R.B.; Wetmiller, R.J. (Canadian Commercial Corp., Ottawa, Ontario). Nov 1983. 22p. NTIS, PC A02/MF A01 - GPO $3.00. Order Number DE84900718.

The ECTN network has remained stable over the past year; progress on the new concentrator software has been slow. Major developments have taken place in the Ottawa Data Laboratory including the installation of a new VAX system and further development of the Seismic Analysis Monitor software. A new initiative has been the development of hardware and software for the Sudbury Local Telemetered Network, which can be considered a prototype for a smart outstation. The performance of the ECTN over the past year is described along with a summary of eastern Canadian seismicity during the reporting period and a list of EPB research publications on eastern Canadian seismicity during the past year. 4 figures, 3 tables.

10963 **(UCRL—89190) Alterant geophysical tomography.** Ramirez, A.L.; Lytle, R.J. (Lawrence Livermore National Lab., CA (USA)). May 1983. Contract W-7405-ENG-48. 5p. (CONF-830870—2). NTIS, PC A02/MF A01. Order Number DE84004794.

From International geoscience and remote sensing symposium; San Francisco, CA, USA (31 Aug 1983).

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We describe and evaluate a new geophysical technique used to remotely map fractures between boreholes: alterant geophysical tomography (AGT). The method requires that the attenuation properties of rock fractures be altered by forcing into the rock a fluid with different electrical properties than those of the native fluids in the rock. Measurements of electromagnetic attenuation factor are performed before and after the tracer is used. Measuring changes in attenuation properties offers significant advantages over measuring absolute attentuation properties. Results of an experiment in which this technique was employed are discussed. 4 references, 4 figures.

5803 Mineralogy, Petrology, And Rock Mechanics

REFER ALSO TO CITATION(S) 9419, 9421, 9432, 9436, 9437, 9440, 9442, 9467, 9468, 9481, 10471

10964 **(BMI/OCRD—4(1)) CSM/OCRD hard rock test facility at the CSM experimental mine, Idaho Springs, Colorado.** Hustrulid, W.A. (Colorado School of Mines, Golden (USA)). Sep 1983. Contract AC02-83CH10140. 16p. NTIS, PC A02/MF A01. Order Number DE84003197.

This report is the first in a series describing research conducted by the Colorado School of Mines (CSM) for the Office of Crystalline Repository Development (OCRD) to determine the extent of blast damage in rock surrounding an underground opening. A special room, called the CSM/OCRD room, was excavated for the purpose of assessing blast damage in the rock around the room. Even though this mine is not proposed as a nuclear waste repository site, the instrumentation and methods of blast damage assessment developed in this project are applicable to proposed repository sites. This report describes the room, and summarizes the overall experimental program. 4 references, 2 figures.

10965 **(BMI/OCRD—4(3)) Hard rock excavation at the CSM/OCRD test site using Swedish blast design techniques.** Holmberg, R. (Colorado School of Mines, Golden (USA). Dept. of Geological Engineering). Sep 1983. Contract AC02-83CH10140. 104p. NTIS, PC A08/MF A01. Order Number DE84003830.

This report is the third in a series describing research conducted by the Colorado School of Mines for the Office of Crystalline Repository Development (OCRD) to determine the extent of blast damage in rock surrounding an underground opening. A special room, called the CSM/OCRD room, was excavated at the CSM experimental mine for the purpose of assessing blast damage in the rock around the room. Even though this mine is not proposed as a nuclear waste repository site, the instrumentation and methods of blast damage assessment developed in this project are applicable to proposed repository sites. This report describes the application of Swedish blasting technology for the excavation of the test room. The design of the blasting patterns including the selection of explosives, hole sizes and location, explosive loading densities, and delay intervals is based upon the theories of Langefors

and Kihlstrom in combination with methods used at the Swedish Detonic Research Foundation for minimizing unwanted rock damage. The practical application of the design procedures to seven rounds and the achieved results is discussed.

10966 **(ONWI—190(4)) Avery Island brine migration tests: installation, operation, data collection, and analysis.** Krause, W.B. (RE/SPEC, Inc., Rapid City, SD (USA)). Dec 1983. Contract AC02-83CH10140. 99p. NTIS, PC A05/MF A01. Order Number DE84005202.

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Three brine migration tests were performed in domal salt at the Avery Island salt mine. The primary measurements included temperature, moisture collection, and pre- and post-test permeability. This report presents the data for the brine migration tests, an analysis of these data, comparison of the data with a brine migration theory, and related discussion and recommendations for future brine migration experiments. 8 references, 37 figures, 6 tables.

10967 **(SAND—83-1553) Stresses and strains at Yucca Mountain from underground nuclear explosions.** Vortman, L.J. (Sandia National Labs., Albuquerque, NM (USA)). Nov 1983. Contract AC04-76DP00789. 53p. NTIS, PC A04/MF A01. Order Number DE84002705.

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The stress and strain imposed on Yucca Mountain by an underground nuclear explosion (UNE) of 700 kt at a distance of 22.8 km is estimated. Surface motion measurements at Yucca Mountain from a UNE on Pahute Mesa were scaled to 700 kt assumed to be at the southern part of the Buckboard Area. Peak values of surface ground motion were reduced for repository depth according to experience from a recent measurement at Yucca Mountain. The P-wave was found to increase vertical stress only 8% above the lithostatic stress and to increase the horizontal stress by an additional 24%. Stresses produced by the Rayleigh wave are smaller than those produced by the P-wave. The P-wave produced a strain of 1.25×10^{-5}. The Rayleigh wave produced a horizontal strain of 9.5×10^{-6}, and a vertical strain of 5×10^{-6}. Because the wavelengths of the P-wave and the Rayleigh wave are so large with respect to a tunnel diameter, no dynamic amplification factors need be taken into account. Although the strains are small, they are much greater than those caused by earth tides or the east-west extension of the tectonic province in which Yucca Mountain is located. 11 references, 2 figures, 3 tables.

5804 Geochemistry

REFER ALSO TO CITATION(S) 9421, 9429, 9431, 9432, 9433, 9434, 9441, 9442, 9513, 10344, 10345, 10490, 10491, 10624, 10747

10968 **(PNL-SA—11773) Further validation of equilibrium thermodynamic speciation of uranium by analytical determination of anionic, cationic, and neutrally charged groups.** Jenne, E.A.; Garland, T.R.; Krupka, K.M. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 13p. (CONF-8311110—1). NTIS, PC A02/MF A01. Order Number DE84004843.

From 6. workshop on environmental research for actinide elements; Hilton Head Island, SC, USA (7 Nov 1983).

We present here a new validation approach wherein analytical charge-form speciation data obtained with resin columns verifies the relative quantities of anionic vs cationic plus neutral species calculated via the MINTEQ equilibrium thermodynamic geochemical model (Felmy and Jenne, 1983). We thereby generally validate thermodynamic calculations of charge-form speciation, identify instances of discordant results which could suggest a deficiency in the thermodynamic model or analytical technique, and demonstrate the necessity of using highly competent geochemical models. 18 references, 2 tables.

10969 **(USGS-PP—1161-A-BB, pp L1-L17) Geochemical studies on the origin of the detrital pyrites in the conglomerates of the Witwatersrand Goldfields, South Africa.** Saager, R. (Univ. of Heidelberg, Germany). 1981. NTIS, PC A19/MF A01. (CONF-7510205—).

From Workshop on genesis of uranium- and gold-bearing precambrian quartz-pebble conglomerates; Golden, CO, USA (13 Oct 1975).

The principal source area of the Witwatersrand sediments, including heavy minerals such as gold, uraninite, and pyrite, lies to the west and north of the basin of deposition. Because this area is overlain by younger rocks, the actual identification of the source area is virtually impossible. On the basis of a hypothetical provenance model it has been suggested earlier that the primary source of the sediments was in the Archean granite-greenstone terrane of the Kaapvaal Craton. For the present study, 57 pyrite samples from primary gold deposits of the greenstone terrane (Swaziland Sequence) and from various gold reefs of the Witwatersrand deposit have been investigated for their trace-element content (Co, Ni, Cu, Zn, Pb, Ag) in order to study the possible presence of similar geochemical trends within both groups of pyrite. The analytical data have been treated by statistical methods, and the results indicate that both the primary and the detrital Witwatersrand pyrites, with respect to the investigated elements, were drawn from the same population. They are both clearly different from the Witwatersrand pyrites formed in situ. Lead isotope investigations carried out on sulfides from primary gold deposits of the Swaziland Sequence and on detrital and authigenic pyrites from the Witwatersrand deposit showed similar isotopic compositions of the lead in detrital pyrite and in primary sulfides from the Swaziland Sequence. The results of the present geochemical studies thus constitute strong evidence that the Archean greenstone belts of the Kaapvaal Craton were the most probable source of the detrital pyrites and also of the gold in the sediments of the Witwatersrand Basin.

5805 Oceanography

REFER ALSO TO CITATION(S) 10738

10970 **(SAND—83-7455C) Consolidation properties and stress history of some deep sea sediments.** Silva, A.J.; Jordan, S.A. (Rhode Island Univ., Narragansett (USA). Marine Geomechanics Lab.). Sep 1983. Contract AC04-76DP00789. 38p. (CONF-8309192—1). NTIS, PC A03/MF A01. Order Number DE84003140.

From IUTAM 83 symposium: seabed mechanics; London, UK (5 Sep 1983).

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This paper summarizes results of 180 consolidation tests on samples from 52 cores taken with a variety of samplers in deep sea regimes of the North Western Atlantic and North Central Pacific. Most of the samplers were of large cross sectional area (over 10-cm dia) and attention was given to improving field techniques and reducing structural disturbance to the sediments. Good quality samples have been recovered to depths in excess of 25 m in several locations. The sediments were primarily fine-grained clays and silty clays with the predominant clay mineral being illite; however, the presence of smectite and calcium carbonate in some samples had significant influence on the properties. 34 references, 11 figures, 2 tables.

10971 **Some two-layer models of the shelf-slope front: Geostropic adjustment and its maintenence.** Ou, H.W. (Lamont-Doherty Geological Observatory of Columbia University, Palisades, NY 10964). *Journal of Physical Oceanography;* 13: No. 10, 1798-1923(Oct 1983). Contract AC02-76EV02185.

Two conceptual models of a two-layered frontal system are presented to study the wintertime shelf-slope front. The first model examines the geostropic adjustment over a step topography after the fall overturning and applied only over short time scales before the nonconservative processes become important. The second model, on the other hand, examines the thermodynamic balance over longer time scales when some dissipative and mixing effects are included. From the geostropic-adjustment model, it is found that the flat-bottom solution of a less-dense shelf water with respect to the slope water is little modified by the presence of a step. But in the case of denser shelf water, the solution shows the detachment of a spillage when the depth ratio across the step is greater than two-resembling some regional observations. In the frictional model,

the wind generted entrainment is demonstrated to provide a virtual momentum source to maintain the along-front current shear against friction and thus can account for the persistence of the front through the winter season. The entrainment also decreases the bouyancy of the exported shelf water, the distribution of which however, varies greatly with the external parameters. For parameter values applicable to the Middle Atlantic Bight, an inflection point, corresponding to a weakened lateral bouyance gradient, is predicted above the front, consistent with observation.

10972 **Principal nonseasonal modes of variation of global sea surface temperature.** Hsiung, J.; Newell, R.E. (Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, Cambridge, MA 02139). *Journal of Physical Oceanography;* 13: No. 10, 1957-1976(Oct 1983). Contract AC02-76EV12195.

Thirty-five million ship reports for the period 1949-79 have been used to construct global, monthly-mean sea surface temperature fields for 5° x 5° latitude-longitude regions. The monthly means have been subjected to eigenvector analysis to bring out the nonseasonal modes of variation. The El Nino mode is the most important and its eigenvector time series is identical to that found previously by Weare et al. for the Pacific alone. Addition of data from the other oceans adds unexplained variance so that the percentage of the variance explained by the El Nino mode is smaller in the global case than for the Pacific alone. The second most important eigenvector pattern shows evidence of a cooling trend for the North Pacific and North Atlantic in the 1964-79 period. This is in agreement with previous work on zonal-mean sea surface temperature by the authors, with recent work on the North Pacific by Douglas et al. and with a polar-cap cooling in the lower troposphere for the same period reported by Boer and Higuchi.

10973 **Near-surface measurements of quasi-Lagrangian velocities in open water.** Churchill, J.H.; Csanady, G.T. (Woods Hole Oceanographic Institution, Woods Hole, MA 02543). *Journal of Physical Oceanography;* 13: No. 9, 1669-1749(Sep 1983). Contract AC02-79EV10005.

Near-surface water velocities have been measured in the coastal zone of Lake Huron and Cape Cod Bay by tracking drifters and drogues using acoustic travel time and compass sighting techniques. The near-surface current, defined as the velocity of near-surface drifters and drogues relative to a drogue set at 1.8 m, varied on the depth scale on the order of 1 m, and was directed nearly parallel to the wind and to predominant wave propagation velocity. Velocity profiles were logarithmic with depth to order 1 m depth, and realistic values of stress were calculated using a law of the wall formula and a Karmans constant of 0.4. Inferred roughness lengths were of the order of 30 cm. Anomalously high values of wind stress were inferred from velocity profiles observed during conditions of light wind and steady swell. These may be due to the similarity of Stokes drift distribution to turbulent shear flow profiles.

64 PHYSICS. I.

6401 Astrophysics And Cosmology

10974 **(BNL—33848) Type II successful supernovae, the anatomy of shocks: neutrino emission and the adiabatic index.** Kahana, S.; Baron, E.; Cooperstein, J. (Brookhaven National Lab., Upton, NY (USA); State Univ. of New York, Stony Brook (USA)). 1983. Contract AC02-76CH00016. 21p. (CONF-8311120—1). NTIS, PC A02/MF A01. Order Number DE84002858.

From Workshop on stellar collapse; Toulouse, France (7 Nov 1983).

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Hydrodynamic calculations of stellar collapse in Type II Supernova are described using a variable stiffness and compressibility for the nuclear equation of state at high density. Initial models employing a relatively small mass core with low central entropy are necessary to achieve viable shocks; near success the models are sensitive to both neutrino emission and the high density equation of state. The treatment of neutrino production and transport is sketched and recent results reported.

10975 **(CEA-CONF—6683) Large scale inhomogeneities and galaxy statistics.** Schaeffer, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Mar 1983. 4p. (CONF-830377—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750267.

From 18. Rencontre de Moriond conference; La Plagne, France (19 Mar 1983).

The density fluctuations associated with the formation of large scale cosmic pancake-like and filamentary structures can be evaluated (1) using the Zeldovich approximation (2) for the evolution of non-linear inhomogeneities in the expanding universe. At the scale introduced by these non-linear density fluctuations due to pancakes, the standard scale-invariant correlation function is modified.

10976 **(EFI—521(8)-82) Stochastic processes and the dynamics of massive black holes.** Gurzadyan, V.G. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704472.

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The role of stochastic processes in the dynamics of massive black hole situated at the centre of a compact star cluster is discussed. It is shown that under certain conditions the black hole can escape from the centre of mass of the system and has to execute Brownian motion influenced by fluctuating stellar perturbations. A massive black hole practically may not be localized at the centre of a globular cluster and has to move within the cluster core influenced by stochastic perturbations of stars. The stochastic behaviour of the black hole is suppressed in compact galactic nuclei, but may become sufficient in nuclei with mean stellar concentration less than 10^4-10^5 ps^{-3}.

10977 **(KFKI—1983-28) Solar wind stagnation near comets.** Galeev, A.A.; Cravens, T.E.; Gombosi, T.I. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Mar 1983. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704473.

The nature of the solar wind flow near comets is examined analytically. In particular, the typical values for the stagnation pressure and magnetic barrier strength are estimated, taking into account the magnetic field line tension and the charge exchange cooling of the mass loaded solar wind. Knowledge of the strength of the magnetic barrier is required in order to determine the location of the contact discontinuity which separates the contaminated solar wind plasma and the outflowing plasma of the cometary ionosphere.

10978 **(LA-UR—83-3621) Observations of the interstellar ice grain feature in the Taurus molecular clouds.** Whittet, D.C.B.; Bode, H.F.; Longmore, A.J.; Baines, D.W.T.; Evans, A. (Preston Polytechnic (UK). Div. of Physics and Astronomy; Los Alamos National Lab., NM (USA); UKIRT, Hilo, HI (USA); Royal Observatory, Edinburgh (UK); Keele Univ. (UK)). 1983. Contract W-7405-ENG-36. 9p. (CONF-8307110—1). NTIS, PC A02/MF A01. Order Number DE84004316.

From Laboratory and observational infrared spectra of interstellar dust conference; Hilo, HI, USA (18 Jul 1983).

Although water ice was originally proposed as a major constituent of the interstellar grain population (e.g. Oort and van de Hulst, 1946), the advent of infrared astronomy has shown that the expected absorption due to O-H stretching vibrations at 3 μm is illusive. Observations have in fact revealed that the carrier of this feature is apparently restricted to regions deep within dense molecular clouds (Merrill et al., 1976; Willner et al., 1982). However, the exact carrier of this feature is still controversial, and many questions remain as to the conditions required for its appearance. It is also uncertain whether it is restricted to circumstellar shells, rather than the general cloud medium. Detailed discussion of the 3 μm band properties is given elsewhere in this volume. 15 references, 4 figures.

10979 **(LUNFD6/NFAS—1003/1-130(1983)) Physical processes in young supernovae.** Fransson, C. (Lund Univ. (Sweden). Institutionen foer Astronomi). Dec 1982. 27p. (In Swedish). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704474.

This thesis consists of four papers on the physical processes in expanding type II supernova envelopes and their environment. Recent observations have shown that type II supernovae are surrounded by a large amount of circumstellar gas, and most of the thesis discusses the interaction of the expanding supernova envelope with this gas. It is found that the resulting shock wave will emit most of its energy as Comptonized EUV radiation plus soft X-rays. This radiation ionizes and heats the circumstellar gas as well as the supernova envelope. The conversion of the Comptonized EUV emission to line emission as a function of time provides an important test of the model. To compare with the UV observations, the line profiles from the various regions are calculated. The X-ray emission and its absorption by the circumstellar gas are shown to give important information on both the shock wave and the environment. Paper I deals with the structure of the shockwave, its emission and absorption of the X-rays by the circumstellar gas. In Paper II the line profiles are calculated and are compared with the observations. Paper III discussed the UV observations, and a simplified analysis of the physical conditions in the gas is given. Finally in paper IV the X-ray emission from the shock, the structure of the envelope and the strengths of the UV emission lines as a function of time are studied.

10980 **(TRITA-EPP—82-09) Plasma physical aspects of the solar cycle.** Raadu, M.A. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Aug 1982. 18p. (CONF-8205220—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704460.

From STP symposium; Ottawa, Canada (1 May 1982).

Mass motions below the photosphere drive the solar cycle which is association with variations in the magnetic field structure and accompanying phenomena. In addition to semi-empirical models, dynamo theories have been used to explain the solar cycle. The emergence of magnetic field generated by these mechanisms and its expansions into the corona involves many plasma physical processes. Magnetic buoyancy aids the expulsion of magnetic flux. The corona may respond dynamically or by continually adjusting to a quasi-static force-free or pressure-balanced equilibrium. The formation and disruption of current sheets is significant for the overall structure of the coronal magnetic field and the physics of quiescent prominences. The corona has a fine structure consisting of magnetic loops. The structure and stability of these are important as they are one of the underlying elements which make up the corona.

10981 **Upper limit on flux of cosmic-ray monopoles obtained with a three-loop superconductive detector.** Cabrera, B.; Taber, M.; Gardner, R.; Bourg, J. (Physics Department, Stanford University, Stanford, California 94305). *Physical Review Letters;* **51**: No. 21, 1933-1936(21 Nov 1983). Contract AM03-76SF00326.

A three-loop superconductive monopole detector has been continuously operated for over 150 days. Its sensing area is 476 cm^2 (71 cm^2 loop area and 405 cm^2 near-miss area) for double coincidence events. The data, which contain no candidate events, set an upper limit of 3.7×10^{-11} cm^{-2} sec^{-1} sr^{-1} (90% C.L.) for monopoles of any mass and at any velocity passing through the Earth's surface.

10982 **Halley's Comet: AD 1986 to 2647 BC.** Brady, J.L. (Lawrence Livermore National Lab., CA). *Journal of the British Astronomical Association;* **92**: No. 5, 209-215(1982). Contract W-7405-ENG-48.

In earlier predictions of the apparitions of Halley's Comet, a three- or four-day error, always with the same sign, has appeared consistently. By adding a secular term to the Newtonian equations of motion it has been possible to link the apparitions of 1910, 1835, 1759 and 1682 with a continuous numerical integration. This backward integration not only represents the last four apparitions but also remains remarkably close to the observed times of perihelion passage for more than 2000 years. The times of perihelion passage are compared to observed or derived dates back to 87 BC, and apparitions prior to 87 BC are compared with historical references whenever they could be found. The starting values of this long integration have been used to make a forward integration and to predict the 1986 return.

6402 Atmospheric Physics

10983 **(FRNC-TH—1291) Ion and electron injection in ionosphere and magnetosphere. Application to the parallel electric field measurement in auroral zones.** Pirre, M. (Orleans Univ., 45 (France)). Nov 1982. 288p. (In French). NTIS (US Sales Only), PC A13/MF A01. Order Number DE84750333.

Portions are illegible in microfiche products.

New methods of measuring parallel electric field in auroral zones are investigated in this thesis. In the studied methods, artificial injection of ions (Li^+ and electrons from a spacecraf is used. Measurements obtained during the ARAKS experiment are also presented. The behaviour of the ionospheric plasma located few hundred meters from a 0,5A electron beam injected in ionosphere from a rocket is studied, together with the behaviour of a Cs plasma artificially injected from the same spacecraft.

10984 (INIS-mf—8663, pp 14) **Role of plasma instabilities in the production of ionospheric irregularities.** Dyson, P.L. (La Trobe Univ., Bundoora (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

10985 **(LA-UR—83-2515) Computer simulation of reconnection in planetary magnetospheres.** Birn, J. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 17p. (CONF-8308148—1). NTIS, PC A02/MF A01. Order Number DE84001389.

From International Astronomical Union symposium; College Park, MD, USA (8 Aug 1983).

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The earth's magnetosphere provides an ideal opportunity to model reconnection in well known geometries that are close enough to the idealized analytic models to make a comparison of the computer models with analytic theory meaningful. In addition more detailed, even three-dimensional, models can be used for a comparison with extended data from in situ observations. The computer studies have basically confirmed the reconnection picture that was based on two-dimensional steady state models and linear analytic theory. The three-dimensional models in particular have also added a lot more information on the reconnection process and the structure of flow, magnetic fields, and currents including many features that are consistent with observations and empirical models of geomagnetic substorms.

10986 **(LA-UR—83-3239) Particle and field signatures of substorms in the near magnetotail.** Baker, D.N. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 44p. (CONF-8310229—7). NTIS, PC A03/MF A01. Order Number DE84003777.

From Chapman conference on magnetic reconnection; Los Alamos, NM, USA (3 Oct 1983).

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The near-earth magnetotail ($10 \leqq r \leqq 20$ R/sub E/) portion of the terrestrial magnetosphere is very likely the region in which magnetospheric substorms are initiated and it is in this location that substorm-related magnetic reconnection appears to occur. An observational advantage compared to other astrophysical regions is that the near magnetotail can be nearly continuously monitored by spacecraft that are relatively fixed in location. Observations of magnetic fields and plasma distribution functions in the neartail reveal a very regular and predictable sequence of variation in association with substorms. These data, considered in a global context, provide very strong evidence for the neutral line substorm model and, thus, for the regular occurrence of magnetic reconnection in the near-earth magnetotail during substorms.

10987 **(RL—82-048) Electron distributions in the plasmas of the earth's magnetosphere - an experiment for AMPTE-UKS.** Hall, D.S.; Chaloner, C.P.; Shah, H. (Rutherford Appleton Lab., Chilton (UK)). Jun 1982. 54p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704475.

The objectives, measurement techniques and technical requirements of the electron experiment to be included in the UK-Satellite of the Active Magnetospheric Particle Explorer (AMPTE) mission are described under sections entitled; experiment objectives, experiment technique, mechanical, electrical, command and data handling requirements, ground support equipment interfaces, test procedures, and special requirements. In appendices the experiment controller and the measurement sequence are shown.

10988 **(TRITA-EPP—82-08) Inductive electric fields in the magnetotail and their relation to auroral and substorm phenomena.** Pellinen, R.J.; Heikkila, W.J. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Nov 1982. 113p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704546.

The paper reviews the importance of inductive electric fields in explaining different magnetospheric and auroral phenomena during moderately and highly distrubed conditions. Quiet-time particle energization and temporal development of the tail structure during the substorm growth phase are explained by the presence of a large-scale elctrostatic field directed from dawn to dusk over the magentotail. Conservation of the first adiabatic invariant in the neutral sheet with a small value of the gradient in the magnetic field implies that the longitudical energy increases at each crossing of the neutral sheet. At a certain moment, this may result in a rapid local growth of the current and in an instability that triggers the onset. During the growth phase energy is stored in the magnetic field, since the energy density in the electric field is negligible compared to that of the magnetic field. An analytical model is described in which the characteristic observations of a substorm onset are taken into account. One major feature is that the triggering is confined to a small local time sector. During moderate disturbances, the induction fields in the magnetotail are stronger by at least one order of magnitude than the average cross-tail field. Temporal development of the disturbed area results in X- and O-type neutral lines. Particles near to these neutral lines are energized to over 1 MeV energies within a few seconds, due to an effective combination of linear and betatron acceleration. The rotational property of the induction field promotes energization in a restricted area wiht dimensions equivalent to a few Earth's radii. The model also predicts the existence of highly localized cable-type field-aligned currents appearing on the eastern and western edges of the expanding auroral bulge.

6403 Atomic, Molecular, And Chemical Physics

REFER ALSO TO CITATION(S) 10553, 11150, 11258, 11285

10989 **(BNL—33473) Two accel/decel experiments: electron capture for 6 to 20 MeV S^{10-16+} on He and Ar and interference effects in MO K x-ray spectra for 5, 10, and 20 MeV Cl^{16+} on Ar.** Johnson, B.M. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-830390—3). NTIS, PC A02/MF A01. Order Number DE84002851.

From US/Japanese seminar on physics of highly ionized ions produced in heavy ion collisions; Honolulu, HI, USA (14 Mar 1983).

The recent development of four-stage accel-decel operation of the dual MP tandem accelerators at Brookhaven National Laboratory has made it possible to extend atomic collision experiments over an unprecedented range of high charge states and low velocities. Briefly, this mode of operation uses the first MP tandem conventionally for two stages of acceleration, then with a negative terminal voltage the second MP tandem provides a third stage of acceleration to high velocity, stripping to high charge state and a final stage of deceleration to low velocity. Details of operation and recent upgrades of the facility were reviewed earlier. An overview of present capabilities and the results of two experimental studies using accel-decel beams are presented here.

10990 **(DOE/ER/05776—12) Spectroscopy of surface adsorbed molecules. Progress report, May 1, 1983-April 30, 1984.** Coleman, R.V. (Virginia Univ., Charlottesville (USA). Dept. of Physics). 1984. Contract AS05-78ER05776. 8p. NTIS, PC A02/MF A01. Order Number DE84005254.

Progress is reported on the understanding and control of the barrier properties for applications to inelastic electron tunneling spectroscopy. A correlation of the barrier behavior with molecular reactivity and pi-delocalization has led to an initial understanding of the large barrier perturbations introduced by some dopant molecules.

10991 **(DOE/ER/13012—2) Multilevel relaxation phenomena and population trappings. Progress report, July 1, 1982-June 30, 1984.** Hioe, F.T. (Saint John Fisher Coll., Rochester, NY (USA)). Jan 1984. Contract AC02-82ER13012. 14p. NTIS, PC A02/MF A01. Order Number DE84005270.

We have made significant advances in our understanding of multiphoton and multilevel coherent effects in laser induced excitation of atomic systems by obtaining a number of fundamental analytic solutions to these problems. In particular, we have obtained the following: an explicit analytic solution to the problem of multilevel atomic excitation by adiabatic rapid passages; analytic solutions for a class of nonadiabatic excitation processes by specific types of amplitude and phase modulated laser pulses; analytic solutions for a class of multiple soliton propagation problems; an analytic solution which gives one of very few known analytic theories describing the evolution of an atom excited by two amplitude modulated laser pulses differing by a pi/2 phase; and analytic results on the statistical mean motion of an atom when it interacts with a quantized radiation field.

10992 (INIS-mf—8299, pp 129-130) **Upper limit for the axion decay of ortho-positronium.** Wahl, H.; Habs, D.; Kroth, R.; Schwalm, D.; Specht, H.J. (Heidelberg Univ. (Germany, F.R.). Physikalisches Inst.); Adelberger, E. (Washington Univ., Seattle (USA)); Metag, V. (Giessen Univ. (Germany, F.R.). 2. Physikalisches Inst.); Simon, R.S. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The existence of a new pseudoscalar boson, called axion, has been proposed to avoid P and CP violations in the standard model of strong interactions. If the axion mass msub(a) is smaller than twice the electron mass msub(e), then orthopositronium may decay into an axion and a monoenergetic photon. As the axion would be only weakly interacting we tried to detect the monoenergetic photon instead. We developed a $^3S_1$ positronium source where the positrons from the decay of ^{68}Ge pass through a thin plastic scintillator and then stop in SiO_2 powder. The Darmstadt-Heidelberg crystal ball was used to discriminate against the normal Ps $^3S_1$ -> 3γ decay and to look for the rare events where one and only one of the 162 NaI modules fired in delayed coincidence with the plastic scintillator. No "axion line" was observed, and from the statistical accuracy of our data accumulated so far we calculate an upper limit for 5×10^{-7} for the branching ratio relative to the 3γ decay.

10993 (INIS-mf—8299, pp 130-132) **K-shell excitation via K-L charge transfer in slow Kr-Kr and Xe-Xe collisions.** Justiniano, E.; Schmidt-Boecking, H.; Schuch, R.; Hoffmann, R.; Schad, W. (Max-Planck-Institut fuer Kernphysik, Heidelberg (Germany, F.R.)); Mokler, P.H.; Bosch, F.; Schoenfeldt, W.A.; Stachura, Z. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)). 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

We have measured K vacancy production probabilities with decelerated highly charged Krsup(q+) (2.8 MeV/u) on Kr and Xesup(q+) (3.6 MeV/u) on Xe by particle-photon coincidences. The impact-parameter-dependent probabilities reveal a dramatic change in shape and absolute height as soon as the projectile bears L shell vacancies. Comparisons with calculations show that K to L shell charge transfer can be described even in the heavy collision

system Xe on Xe by 2pπ-2psigma rotational coupling when the relativistc energy splitting is taken into account.

10994 (INIS-mf—8299, pp 132-133) **Interference effect in the impact parameter dependence of K-K charge transfer in slow S-Ar collisions.** Schmidt-Boecking, H. (Frankfurt Univ. (Germany, F.R.). Inst. fuer Kernphysik); Schulz, M.; Schuch, R.; Justiniano, E.; Ingwersen, H.; Specht, H.J. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The impact parameter dependence of the transfer probability of a target K electron into the projectile K shell was measured in 4.7, 7.9, 16, and 32 MeV S^{15+} on Ar collisions. The transfer probability shows an interference structure as a function of impact parameter which allows a very sensitive test of the models for K-K charge transfer.

10995 (INIS-mf—8299, pp 133-134) **Multiple ionisation and electron capture in 2 MeV/u Brsup(n+) -> Ne collisions.** Kelbch, S.; Ullrich, J.; Schmidt-Boecking, H. (Frankfurt Univ. (Germany, F.R.). Inst. fuer Kernphysik); Schuch, R.; Ingwersen, H. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The recoil ion production cross sections in 2 MeV/u Brsup(n+) Nesup(o) → Brsup(n+) + Nesup(q+) were measured using a projectile-recoil ion coincidence technique, where the final charge states of both collision partners were detected simultaneously. The assumption of binominal statistics for the multiple ionisation of the recoil ions rendered the determination of the ionisation probabilities from the related cross sections. It could be deduced from the experimental data that Ne-K capture dominates.

10996 (INIS-mf—8299, pp 134-135) **Interference effects in the quasimolecular K-radiation induced in collisions of hydrogenlike ions.** Schmidt-Boecking, H. (Frankfurt Univ. (Germany, F.R.). Inst. fuer Kernphysik); Tserruya, I. (Weizmann Inst. of Science, Rehovoth (Israel)); Johnson, B.M.; Jones, K.W.; Meron, M.; Barette, J. (Brookhaven National Lab., Upton, NY (USA)); Schuch, R.; Hoffmann, R.; Ingwersen, H.; Justiniano, E. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The impact-parameter-dependent emission probabilities of quasimolecular X-rays were measured in collisions of 5, 10, and 20 MeV Cl^{10+} on Ar and 16 MeV S^{15+} on Ar. The coincident energy spectra of the quasimolecular K radiation show a clear impact-parameter-dependent structure which is in good agreement with calculations taking into account the interference of 1ssigma decay amplitudes on the incoming and outgoing halves of the trajectory.

10997 (INIS-mf—8299, pp 135-137) **L-Shell ionisation in energetic ion-atom-collisions.** Jitschin, W.; Hippler, R.; Shanker, R.; Lutz, H.L. (Bielefeld Univ. (Germany, F.R.). Fakultaet fuer Physik); Schuch, R. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

A comprehensive study of L shell ionisation of heavy target atoms ($54 <= Z_2 <= 92$) by various projectiles ($1 <= Z_1 <= 79$) has been performed. The main aspect of the investigation is differences in the ionisation cross sections of the magnetic substates (alignment) and of the L subshells. These quantities can be measured with high accuracy and thus allow a sensitive test of ionisation theories.

10998 (INIS-mf—8299, pp 137-138) **Impact parameter dependence of the A_{20}, A_{21}, A_{22} alignment parameters of the Lsub(III)-shell investigated in collisions of 16 MeV α-particles on Dy.** Schmidt-Boecking, H. (Frankfurt Univ. (Germany, F.R.). Inst. fuer Kernphysik); Konrad, J.; Hoffmann, R.; Schuch, R.; Ziegler, F. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The A_{20}, A_{21}, A_{22} alignment parameters of the Lsub(III) shell were determined from the angular distribution of the Lsub(l) line by a coincidence measurement between scattered particles and X-rays in the impact parameter (b) region from 100 to 4000 fm. The previously found strong deviations of A_{20} from the prediction of the SCA at small b were confirmed by these experiments. A_{21} is nearly independent of b, A_{22} is zero at small b and decreases at b > 1000 fm.

10999 (INIS-mf—8299, pp 138-139) **Influence of the nuclear reaction time onto the delta-electron emission studied by the reaction J → Au,Bi at 795 and 840 MeV.** Herath-Banda, M. (Vanderbilt Univ., Nashville, TN (USA)); Kozhuharov, C. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)); Koenig, W.; Lutz, N.; Martin, B.; Povh, B.; Skapa, H.; Soltani, J. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

Spectra of high energetic atomic electrons (delta electrons) were recorded in the case of quasielastic and deep inelastic scattering of J → Au and Bi at incident energies of 6.25 and 6.6 MeV/u, respectively. Total kinetic energy, mass difference, and total mass of the binary reaction products were measured via kinematical coincidences by a parallel plate avalanche counter with angular geometry (THETA = 10°-60°). A distinct change of the slope of the coincident electron spectrum is expected as a function of the nuclear reaction. The data analysis is still in progress.

11000 (INIS-mf—8299, pp 139-141) **Study of binding energies and electron densities in superheavy quasiatoms by means of delta-ray spectroscopy.** Herath-Banda, M.; Ramayya, A.V. (Vanderbilt Univ., Nashville, TN (USA)); Kozhuharov, C. (Gesellschaft fuer Schwerionenforschung m.b.H., Darmstadt (Germany, F.R.)); Koenig, W.; Lutz, N.; Martin, B.; Povh, B.; Skapa, H.; Soltani, J. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphyik: Annual report 1982.

The emission of high energetic electrons (50-1000 keV) was measured for the systems Br → Pb, U, J → Au, Bi, and Au → U. From electron K X-ray coincidences K-L binding energy differences of the quasiatom were determined. Whereas in the range Zsub(u) < or approx. 145 the results show good agreement with calculations performed in the adiabatic approximation, the 1s-2s binding energy difference obtained for the heaviest system (Zsub(u) = 171) is already at 3.2 MeV/u incident energy significantly smaller. The impact parameter dependence of the emission from the quasiatomic K shell of the Au-U system indicates in addition a distinctly smaller increase of the electron density near the nuclei than expected.

11001 (INIS-mf—8299, pp 154) **Influence of statistical fluctuations of heavy ion cross sections on the spectrum of atomically created positrons.** Tomoda, T. (Technische Univ. Muenchen, Garching (Germany, F.R.). Fakultaet Physik); Weidenmueller, H.A. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11002 **(INIS-mf—8632) Fundamental aspects of laser and ion-beam interactions with solid surfaces.** Wang, Z.L. (Rijksuniversiteit Utrecht (Netherlands)). 13 Sep 1982. 131p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704731.

In the first part of the thesis laser-beam interactions with solid surfaces are discussed. In the second part ion-beam interactions with solid surfaces are discussed and mainly the mixing of atoms due to ion bombardment. A study of ion-beam mixing of Cu-Au and Cu-W systems is described in order to illustrate the mechanism for ion beam mixing. As Cu-Au are miscible whereas Cu-W systems are not, and both systems have comparable mass numbers, comparison provides a test for current theories on ion-beam mixing. The results of experiments where 300 keV Kr^{4+} ion-bombardment at a dose of $5x10^{15}$ cm^{-2} has been applied to initiate mixing of a single layer structure and sandwich samples for both systems are described. Room temperature irradiations with a dose of $5x10^{15}$ cm^{-2} show that Cu-Au mix readily, whereas a small mixing effect is observed for Cu-W systems. A comparable amount of mixing for

Cu-Au induced by laser or ion beams is found whereas no mixing of Cu-W induced by laser irradiation is observed, which is in agreement with the criteria for formation of metastable solid solutions due to pulsed laser treatment.

11003 **(INIS-mf—8637) Non vertical vibronic transitions in atom molecule collisions.** Klomp, U.C. (Amsterdam Univ. (Netherlands)). 3 Nov 1982. 131p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704725.

This thesis is mainly devoted to an experimental and theoretical study on vibronic transitions which occur in collisions between an alkali atom and several diatomic molecules. An experimental study on electron and ion production in repulsive Cs-CO and Cs-N_2 collisions, and in Cs-NO and Cs-O_2 non-repulsive collisions is presented. The experimental data are discussed in terms of some existing models. It is clear that a new consistent theory on vibronic transitions is needed to explain the experimental data. Such a theory is presented, and it is shown that some existing models are limiting cases of this theory. An experimental study on the relative probabilities for ion and electron production in collisions between a Na, K or Cs atom and an O_2 or NO molecule is also described. These experiments suggest that the incident velocity of the alkali atoms has a predominant influence on the relative probabilities for ion and electron production in these collisions.

11004 **(INIS-mf—8651) High resolution studies of barium Rydberg states.** Eliel, E.R. (Vrije Univ., Amsterdam (Netherlands)). 8 Sep 1982. 192p. NTIS (US Sales Only), PC A09/MF A01. Order Number DE83704726.

The subtle structure of Rydberg states of barium with orbital angular momentum 0, 1, 2 and 3 is investigated. Some aspects of atomic theory for a configuration with two valence electrons are reviewed. The Multi-Channel Quantum Defect Theory (MQDT) is concisely introduced as a convenient way to describe interactions between Rydberg series. Three high-resolution UV studies are presented. The first two, presenting results on a transition in indium and europium serve as an illustration of the frequency doubling technique. The third study is of hyperfine structure and isotope shifts in low-lying p states in Sr and Ba. An extensive study of the 6snp and 6snf Rydberg states of barium is presented with particular emphasis on the 6snf states. It is shown that the level structure cannot be fully explained with the model introduced earlier. Rather an effective two-body spin-orbit interaction has to be introduced to account for the observed splittings, illustrating that high resolution studies on Rydberg states offer an unique opportunity to determine the importance of such effects. Finally, the 6sns and 6snd series are considered. The hyperfine induced isotope shift in the simple excitation spectra to 6sns $^1S_0$ is discussed and attention is paid to series perturbers. It is shown that level mixing parameters can easily be extracted from the experimental data.

11005 **(INIS-mf—8654) Avalanches in insulating gases.** Verhaart, H.F.A. (Technische Hogeschool Eindhoven (Netherlands)). 14 Sep 1982. 120p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704727.

Avalanches of charged particles in gases are often studied with the "electrical method", the measurement of the waveform of the current in the external circuit. In this thesis a substantial improvement of the time resolution of the measuring setup, to be used for the electrical method, is reported. The avalanche is started by an N_2-laser with a pulse duration of only 0.6 ns. With this laser it is possible to release a high number of primary electrons (some 10^8) which makes it possible to obtain sizeable signals, even at low E/p values. With the setup it is possible to analyze current waveforms with a time resolution down to 1.4 ns, determined by both the laser and the measuring system. Furthermore it is possible to distinguish between the current caused by the electrons and the current caused by the ions in the avalanche and to monitor these currents simultaneously. Avalanche currents are measured in N_2, CO_2, O_2, H_2O, air of varying humidity, SF_6 and SF_6/N_2 mixtures. Depending on the nature of the gas and the experimental conditions, processes as diffusion, ionization, attachment, detachment, conversion and secondary emission are observed. Values of parameters with which these processes can be described, are derived from an analysis of the current waveforms. For this analysis already published theories and new theories described in this thesis are used. The drift velocity of both the electrons and the ions could be easily determined from measured avalanche currents. Special attention is paid to avalanches in air becasue of the practical importance of air insulation.

11006 **(INIS-mf—8658) Influence of collisions with noble gases on spectral lines of hydrogen isotopes.** Hermans, P. (Rijksuniversiteit Leiden (Netherlands)). 10 Nov 1982. 125p. NTIS (US Sales Only), PC A06/MF A01. Order Number DE83704728.

In this thesis measurements on the collisional broadening of the depolarized Rayleigh line and the broadening and shift of the rotational Raman lines (radiative transitions 0→2, 1→3 and 2→4) are presented. The experiments were carried out as a function of temperature from 23 K to 311 K for three systems, viz. H_2-He, H_2-Ne and H_2-Ar. Also results of close coupled calculations on the broadening and shift are presented as a function of temperature for the four spectral lines mentioned. The calculations were performed for two systems, viz H_2-He and H_2-Ne. For the system H_2-He two interaction potentials were used as a starting point, and a comparison between these potentials was made. Now that it is possible to do computations on effects related to the non-spherical interaction of the pure hydrogen isotopes, the availability of experimental data is of great importance. Many experiments on these effects have been performed over the last two decades, but their results are scattered throughout the literature. Therefore, in the last chapter of this thesis the experimental results for the pure hydrogen isotopes and in mixtures with noble gases are compiled to serve as comparing material for the calculations. The presentation is such that a direct comparison with calculations is facilitated.

11007 **(INIS-mf—8662) Charge and spin density in s-stable rare earth intermetallic compounds.** de Graaf, H. (Rijksuniversiteit Leiden (Netherlands)). 1 Dec 1982. 173p. NTIS (US Sales Only), PC A08/MF A01. Order Number DE83704729.

This thesis deals with a study of the electronic structure of rare earth intermetallic compounds, in particular the electronic charge and spin density distribution. These are closely related to the properties of the rare earth ions, which carry the partly filled 4f shell. In chapter 1 a survey of the theory of hyperfine interaction as far as it has a bearing on the Moessbauer effect of ^{155}Gd and ^{151}Eu is given. Also some details of the Moessbauer spectra, which have practical importance are discussed. In chapter 2 the experimental set-up is described. Special attention is paid to the gamma radiation source and gamma detection requirements. In chapter 3 the author introduces the theoretical framework which will be used to interpret the measurements. In chapter 4 the results of the ^{155}Gd Moessbauer measurements are presented. Also it is discussed how the result can be understood in terms of the charge and spin density in rare earth intermetallic compounds. In order to lend support to the picture emerging from the previous chapter, in chapter 5 the conduction electron band structure of some representative Gd intermetallics is computed with an approximate semi-empirical LCAO method. The results are compared with those from chapter 4. Finally, in chapter 6, the ^{151}Eu resonance is used to investigate the temperature dependence of the hyperfine field and line width in the Eu intermetallic compounds Eu_2Mg_{17} and $EuMg_5$.

11008 (INIS-mf—8663, pp 50) **Derivation of the Li^+-He interaction potential from mobility data.** Cassidy, R.A.; Elford, M.T. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11009 (INIS-mf—8663, pp 38) **Hydrogen ion scattering from surfaces.** MacDonald, R.J.; O'Connor, D.J.; Quinan, R. (Newcastle Univ. (Australia). Dept. of Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11010 (INIS-mf—8663, pp 68) **Neutralisation rates associated with the scattering of low energy ions from surfaces.** MacDonald, R.J.; O'Connor, D.J. (Newcastle Univ. (Australia). Dept. of Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11011 **Exciton kinetics in condensed rare gases.** Hitachi, A. (Radiation Laboratory, University of Notre Dame, Notre Dame, Indiana 46556). *Journal of Chemical Physics;* **80**: No. 2, 745-748(15 Jan 1984).

An attempt has been made to explain large rate constants for Penning-type ionization in condensed rare gas mixtures. Excitons are treated as particles moving rapidly in condensed media with a mass similar to the electron mass. A formula for Penning ionization of atom collisions induced by a dipole—dipole interaction gives cross sections of the correct order of magnitude.

11012 **Bond length and electronic structure of V_2.** Langridge-Smith, P.R.R.; Morse, M.D.; Hansen, G.P.; Smalley, R.E.; Merer, A.J. (Rice Quantum Institute and Department of Chemistry, Rice University, Houston, Texas 77251). *Journal of Chemical Physics;* **80**: No. 2, 593-600(15 Jan 1984).

We report of the first gas-phase electronic spectrum of V_2. The dimer was generated in an expansion cooled molecular beam by laser vaporization of vanadium metal. Using the technique of resonant two photon ionization spectroscopy a strong band system with origin near 7000 A was observed. Rotationally resolved spectra of this band system conclusively demonstrate that the transition is of the type ^{3}Pi/sub u/(a)←$^3\Sigma^-$/sub g/(a), and we assign the $^3\Sigma^-$/sub g/ state as the ground electronic state of V_2. The short ground state bond length r/sub e//sup double-prime/ = 1.77 A and high vibrational frequency ω/sub e//sup double-prime/ = 535 cm^{-1} are indicative of extensive 3d-orbital participation in the bonding of this molecule. The unusual case (a) coupling and large second-order spin-orbit splitting observed in the $^3\Sigma^-$/sub g/ state implies that the ground state electronic configuration contains a half-filled π(3d) or δ (3d) orbital. The most plausible valence configuration consistent with the data is σ/sub g/(3d)$^2\pi$/sub u/(3d)$^+$ σ/sub g/(4s)$^2\delta$/sub g/(3d)^2. In the excited state there is strong evidence of predissociation occuring for levels higher than 14 872 cm^{-1} above the ground state, thus providing an upper bound of 1.85 eV for the dissociation energy of V_2.

11013 **Resonant multiphoton ionization of NO via the A $^2u^+$ state: Photoelectron spectra and angular distributions.** White, M.G.; Chupka, W.A.; Seaver, M.; Woodward, A.; Colson, S.D. (Chemistry Department, Brookhaven National Laboratory, Upton, New York 11973). *Journal of Chemical Physics;* **80**: No. 2, 678-686(15 Jan 1984).

Photoelectron spectra resulting from the two-photon resonant, four-photon ionization of NO via the A $^2\Sigma^+$ state are reported for several rotational levels in the A, v = 0 manifold. The observed final ionic state vibrational distributions are found to be consistent with and confirm spectroscopic studies which have assigned intense features in the four-photon A state MPI spectrum with accidental resonances in the energy range of the third photon. The upper states in the strong accidental double resonance transitions are assigned to Rydberg vibronic levels which are strongly perturbed by nearby valence states. Photoelectron angular distributions were also measured for two vibronic transitions and these are interpreted on the basis of a simple, one-electron description of the ionization step.

11014 **Transition probability and collision broadening of the 1.3-μm transition of atomic iodine.** Engleman, R. Jr.; Palmer, B.A.; Davis, S.J. (Chemistry Division, Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Journal of the Optical Society of America;* **73**: No. 11, 1585-1589(Nov 1983).

We have made direct absorption measurements of the transition probability and collision broadening of the 1.3-μm ^{2}P/sub 1/2/ → ^{2}P/sub 3/2/ transition of atomic iodine. Atomic iodine was generated in heated iodine vapor, and the spectrum was obtained with a Fourier-transform spectrometer. A transition probability was measured that corresponds to a ^{2}P/sub 1/2/ radiative lifetime of 125 msec. Broadening coefficients of 1.4, 1.7, 3.1, and 1.3 MHz/Torr at 1000 K were found for argon, oxygen, molecular iodine, and atomic iodine, respectively. The intensity of the (2, 4) forbidden electric-quadrupole line was measured and yielded the ratio of electric-quadrupole to magnetic dipole transition probability of 2.7 x 10^{-3}. Molecular absorption spectra of IO and SiI were seen in high-temperature spectra of a quartz cell containing and I_2/O_2 mixture.

11015 **K-vacancy production in heavy-ion-atom collisions at small impact parameters.** Anholt, R. (Stanford University, Stanford, CA 94305). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* No. 2, 1074-1077(1982). (CONF-801111—).

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The probability P(b) of forming K vacancies in 60-MeV I + Ag collisions with center-of-mass scattering angles θ /SUB cm/ between 20° and 144° was measured. The measured probability varies approximately as $\sin^2\theta$ /SUB cm/ , as predicted for the kinematic peak part of 2pσ-2pπ rotatational coupling. The authors conclude that while the shape of P(b) indicates that 2pσ-2pπ rotational coupling is important in the creation of K vacancies, the probability of creating the initial 2pπ vacancy must be impact parameter dependent. In other collisions where a rise in P(b) has been observed at low impact parameters, it is possible that the rise is due not to a kinematic peak, but to a contribution from lsσ vacancy production.

11016 **Angular distribution of Pb L x-rays excited by 3 MeV protons.** Clark, M.; Hurst, S.; Shafroth, S.M.; Swenson, J.; Varghese, S.L.; Willis, J.E. (Univ. of North Carolina at Chapel Hill and Triangle Universities Nuclear Laboratory, Durham, NC). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1117-1118(Apr 1981). (CONF-801111—).

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The authors have measured the angular distribution of Pb L1 and Lα x-rays in the case of lead where the targets were typically 100 ug/cm^2 thick with a 400 ug/cm^2 layer of silver evaporated on each side. Spectra were obtained at 25, 45, 65, 90, 115, 135 and 155° and ratios of Pb L x-rays to the isotropic Ag K x-rays were taken. The most readily interpretable case is L1 since this transition involves only the Lm subshell. After correcting for x-ray absorption in the target assuming it to be layered (i.e. neglecting diffusion of the Ag in the Pb) the authors find a small deviation from isotropy, which is expected due to enhanced depopulation of M=0 substates at small impact parameter collisions. The velocity dependence of the alignment parameter A_2 has been calculated using PWBA and screened as well as unscreened wave functions. Results for A_2 agree with these calculations. Further work is under consideration.

11017 **Neutron polarization measurements using the pulsed-polarized proton and deuteron beams at TUNL.** Walter, R.L. (Duke University, Durham, NC 27706). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1260-1263(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Nanosecond wide pulses of polarized protons or deuterons at a repetition rate of 4 MHz are now routinely available for studying interactions involving outgoing neutrons. Up to 90 nA of protons and 200 nA of deuterons have been observed on target. The authors' first experiments involved the determination of the analyzing power A /SUB y/ (UJ) for a few (→p,n) and (→d,n) reactions using conventional neutron time-of-flight detection. A major program for observing polarization effects in neutron elastic scattering has been initiated. The source of polarized neutrons for this program is the ^{2}H(→d,n→)^{3}He reaction which yields a neutron beam having 90% of the polarization of the incident deuterons.

11018 **Energy straggling of helium ions in aluminum.** Oberlin, J.C.; Amokrane, A.; Beaumevieille, H.; Stoquert, J.P. (Center des Sciences et de La Technologie Nucleaires, R.P. 1017, Alger). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1225-1226(Apr 1981). (CONF-801111—).

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Straggling of $^3He^+$ ions in thin films of Al has been measured in the energy range 1.1 - 2.3 MeV. The energy straggling was obtained by taking the backscattering spectra of incident ions first from a clean Ta backing, then from an identical Ta backing onto which a thin Al film has been evaporated. The straggling values were compared with predictions of various theories. The results calculated by Bohr and Lindhard-Scharff theories are respectively 15% and 30% lower than our experimental measurements, whereas those are in good agreement with the Bethe-Livingston theory.

11019 **Laser spectroscopy of negative ion beams.** Mead, R.D.; Feigerle, C.S.; Lineberger, W.C.; Schulz, P.A. (Univ. of Colorado and Joint Institute for Laboratory Astrophysics, Boulder, Colorado 80309). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1194-1197(Apr 1981). (CONF-801111—).

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The availability of intense tunable and fixed frequency lasers has made it possible to investigate photon-ion interactions in crossed beam experiments. The short wavelength limitations of current lasers result in the greatest variety of applications having been made to studies of photon interactions with negative ions. Two major experimental approaches have been developed: fixed frequency laser negative ion photoelectron spectroscopy and tunable laser photodetachment/photodissociation spectroscopy. The former approach is best suited for determination of electron affinities and structural properties of ions and free radicals, while the latter method provides highly accurate electron affinities and dynamical information on electron-molecule interactions. It is also possible to determine the internal energy content of negative ions. The experimental techniques and their limitations are discussed in the form of several case studies: OH^-, C_2^- and the transition metals. Finally an attempt is made to ascertain promising avenues for new investigations in this field.

11020 **Efficient neutron production using 12 MeV electrons.** Bowman, C.D. (National Bureau of Standards, Washington, DC 20234). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1485-1487(Apr 1981). (CONF-801111—).

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A comparison of (γ,n) and atomic cross sections shows that neutron production with an electron beam can be as energy efficient with 12-MeV electrons as with the conventionally used 30- to 100-MeV electrons. Neutron production from tungsten using 100-MeV electrons is compared with a thin tungsten converter followed by a deuterium-containing target using electrons near 12 MeV. For a BeD_2 target a yield of $2x10^{12}$ neutrons per kilojoule of beam power is predicted.

11021 **Final charge states of ions scattered to large angles by single collisions.** Antar, A.A.; Kessel, Q.C. (The University of Connecticut, Storrs, CT 06268). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1230-1232(Apr 1981). (CONF-801111—).

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Measurements of the charge states of ions following ion or atom excitation, have been used as probes of atomic structure since the early 1900's. More recently, the investigation of the final charge states of heavy ions scattered from heavy atoms has led to the realization that much of the ionization results from the production and subsequent cascade filling of inner-shell vacancies. The development, by Fano and Lichten, of the molecular orbital model for heavy ion-atom collisions has made our present understanding of these collisions possible. Today charge state measurements are made not only because of their intrinsic interest, but because they shed light on the molecular dynamics of collisions over a wide range of collision energies. It is found that collisions from 100 ev to 100 Mev can have features in common, and that an effective way of testing the molecular orbital model over this wide range of energies is to measure charge states as a function of scattering angles for single collisions.

11022 **Vacuum ultraviolet emission following impact of Li^+ and He^+ on He and Ne at 5-30 keV.** Jamison, K.A.; Thomson, G.M. (Ballistic Research Lab., ABRADCOM, Aberdeen Proving Ground, Maryland 21005). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1156-1158(Apr 1981). (CONF-801111—).

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Collisions between ions and free atoms at energies of a few keV often elevate the participants into vacuum ultraviolet (VUV) radiative states or into other states which lead to VUV emission as part of their deexcitation cascade. The wavelengths of these emissions are characteristic of the emitting species and their VUV production cross sections are often large. In recent years these attributes have kindled an increased interest in the exploitation of collision induced VUV spectroscopy for plasma and material diagnostics. The present report updates a continuing study of collision induced VUV emission now underway at the Ballistic Research Laboratory. The effort is aimed at identifying the mechanisms responsible for the production of such states and at measuring their photon production cross sections as a function of impact energies. Four different collision combinations are currently under study: $Li^+ + He$, $He^+ + He$, $Li^+ + Ne$ and $He^+ + He$. In the first two, the projectiles are isoelectronic and isonuclear to the simple closed shell target respectively. As such they will lend themselves to theoretical analysis. The remaining combinations were chosen as examples in which simple projectiles may initiate multiple ionization and other complex processes in a many-electron target.

11023 **Total cross sections and impact-parameter dependence of X-ray production in ion-atom collisions.** Jones, K.W.; Johnson, B.M. (Brookhaven National Laboratory, Upton, New York 11973). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1098-1102(Apr 1981). (CONF-801111—). Contract AC02-76CH00016.

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Extensive experimental data on the production of inner-shell vacancies have been acquired during the past few years. A rather complete picture of the production systematics from very light elements at low energies to very heavy elements at energies of several hundred MeV has emerged. A survey of some of these results for the energy and charge-state dependence of the total cross sections and of the impact-parameter dependence P(b) of the inner shell vacancy production process is presented and compared with theoretical predictions. A number of open questions in the field are discussed and a few suggestions for further work are given.

11024 **K-shell ionization by low-velocity ions.** Rice, R.K.; Basbas, G.; Duggan, J.L.; McDaniel, F.D. (North Texas State University, Denton, Texas 76203). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1103-1108(Apr 1981). (CONF-801111—).

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K-shell x-ray production measurements are reported for protons, deuterons and alpha particles incident on thin foils of copper, niobium, silver and antimony. In the velocity range of the experiments, which correspond to 100-600 keV/u, the energy of ionization was as large as 10% of the bombarding energy. The inferred dependence of the excitation process on the projectile mass, atomic number and energy is compared with theoretical estimates of a low-velocity ionization threshold, the binding effect and the Coulomb-deflection effect. Precision of measurement is not great enough to

discern unambiguously the threshold effect, but the binding and Coulomb-deflection effects are clearly distinguished.

11025 **L-shell ionization cross sections of Ba, Ce, Nd, Sm and Dy for proton energies from 0.5 to 2.0 MeV.** Rayburn, L.A. (The University of Texas at Arlington, Arlington, Texas 76019). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: 1109-1111(Apr 1981). (CONF-801111—).

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Protons from the University of Texas at Arlington's 2 MV Van de Graaff accelerator were used to produce characteristic L x-rays from thin targets of Ba, Ce, Nd, Sm and Dy. Incident proton energies were varied from 0.5 to 2.0 MeV. The x-rays were detected by an ORTEC High Purity Germanium Low Energy Photon Spectrometer (LEPS) mounted at 90° to the beam direction. The incident proton beam was monitored by a particle detector also mounted at 90° to the beam direction. The measured x-ray production cross sections were converted to ionization cross sections by the use of subshell fluorescence yields and Coster-Kronig transition probabilities taken from Bambynek. Comparison of these ionization cross sections as well as the ratios of selected subshell x-ray yields with the predictions of the Plane Wave Born Approximation (PWBA) and the Binary Encounter Approximation (BEA) show that the PWBA predictions fit the experimental results much better than the BEA predictions.

11026 **Comparison of L x-ray spectra from multi-stripped ions in P^+ + Ar and S^+ + Ar gas collisions at 100 keV.** Peterson, R.S.; Furst, M.; Hayden, H.C.; Smith, W.W. (The University of Connecticut, Storrs, CT 06268). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1114-1116(Apr 1981). (CONF-801111—).

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Structure in the soft x-ray spectra from projectiles excited in ion-atom collisions at 100 keV has been observed. Previous spectral measurements on these collision systems using a curved crystal Bragg spectrometer were unable to experimentally resolve the multiplet structure. The present results are obtained with a grazing incidence monochrometer and clearly show the resolved structure from L x-rays of neon-like and flourine-like ions. The L x-ray spectra from phosphorus and sulfur ions after single collisions in argon gas targets are compared to establish x-ray line identifications. The individual spectra yield information on the collision mechanism involving the inner-shell promotion of L-shell electrons and the simultaneous outer-shell electron excitation. The model for L-shell vacancy production in asymmetric ion-atom collisions assumes that two 2p electrons of the lower-Z projectile are promoted via the $4f\sigma$ molecular-orbital. Because this orbital is coupled to many empty molecular orbitals, the probability that one or two 2p electrons are promoted to higher orbitals is unity for ion-atom collisions where the L shells interpenetrate. The promotion leaves one or two 2p vacancies in the lower-Z atom after the collision. This model agrees well with experimental observations of energy loss and total vacancy production cross sections. However, the small L x-ray yields, which result after vacancy production, increase dramatically with the collision energy, indicating the possibility of strong outer-shell excitation mechanisms accompanying the inner-shell electron promotion.

11027 **Projectile charge state dependence of M-shell ionization of Au, Pb, Bi and U by 1.42-MeV/amu fluorine ions.** Mehta, R.; Andrews, M.C.; Chaturvedi, R.P.; Duggan, J.L.; Lapicki, G.; McDaniel, F.D.; Miller, P.D.; Wheeler, R.M. (North Texas State University, Denton, TX 76203). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1122-1125(Apr 1981). (CONF-801111—).

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The present study was undertaken to determine the direct ionization and electron capture contributions to vacancy production in the M-shells of $_{79}$Au, $_{82}$Pb, $_{83}$Bi and $_{92}$U for incident $^{19}_{9}$F ions. M-shell x-ray production cross sections have been measured for 1.42-MeV/amu $^{19}_{9}$F /SUP q/ $^{+}$ ions for q=4,5,6,8,9. Enhancements in the target x-ray production cross sections were observed for projectiles with one and two K-shell vacancies over those without K-shell vacancies. Direct ionization and electron capture contributions to the vacancy production were extracted from the data and compared to the plane wave Born approximation and to the Oppenheimer-Brinkman-Kramers calculations of Nikolaev, respectively.

11028 **Cross sections for K- and L-shell excitation in energetic ion-atom collisions.** Schneider, D. (Hahn-Meitner-Institut fur Kernforschung, 1000 Berlin 39, Glienicker Str. 100). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* No. 2, 1126-1130(Apr 1981). (CONF-801111—).

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Absolute K- and L-shell vacancy production cross sections have been determined from Auger-electron measurements in various heavy-ion-atom collisions. Collision systems with atomic numbers Z between 5 and 18 and with projectile energies varied between 6 and 600 keV were investigated. From cross section plots for some exemplary collision systems general trends are indicated and discussed in terms of the molecular-orbital (MO) model. Cross section ratios are deduced and compared to theoretical predictions.

11029 **Ionization by low and intermediate energy ion and neutral beams.** Rudd, M.E. (University of Nebraska, Lincoln, Lincoln, NE 68588). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1135-1138(Apr 1981). (CONF-801111—).

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One of the most important basic processes that take place in collisions of atomic systems is ionization resulting in the emission of electrons. A complete understanding of this process is complicated by the fact that electron emission can take place via a number of mechanisms, some of which are related. Simple measurements of the cross section for electron ejection as a function of projectile velocity does not usually provide enough information to unravel the various mechanisms. But cross sections which are differential in the angle and energy of the ejected electrons, which are now available for protons on a variety of target gases, can be used to elucidate these mechanisms. While most of the experiments of this type have been done at high energies (above, say, 100 keV) there is now data available at energies as low as 5 keV for protons on various gases and to 15 keV for neutral hydrogen atoms on helium gas. At these low energies the angular distributions tend to become less anisotropic than at higher energies and do not yield as much information, but from the energy distributions integrated over angle the authors have been able to construct a mechanism which describes the results quite well. Also they have found a simple empirical equation for the cross sections differential in ejected electron energy which is of great potential usefulness to workers in various applied areas in which secondary electrons from collisions are involved.

11030 **Convoy electrons from solids in coincidence with the final projectile charge state.** Loubert, R.; Breining, M.; Elston, S.; Huldt, S.; Liljeby, L.; Sellin, I.A.; Thoe, R.S. (East Carolina University, Greenville, North Carolina 27834). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* No. 2, 1143-1145(Apr 1981). (CONF-801111—).

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The authors measure the yield and final velocity distribution of electrons accompanying the projectile exiting from thin solid targets in coincidence with the projectile charge state. They find that the yield per emergent projectile and the longitudinal velocity distribution is independent of the final projectile charge state.

11031 **On charge transfer in ion-atom collisions at intermediate collision velocities.** Fritsch, W.; Lin, C.D.; Tunnell, L.N. (Kansas State University, Manhattan, KS 66506). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* NS-28: No. 2, 1146-1148(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The authors study charge transfer at intermediate energies for multielectron ion-atom collisions within the coupled-state impact-parameter method. They point out the importance of assumptions about electronic relaxation by comparing various calculations of cross sections for KK charge transfer in F^{9+} + Si as a test case. In these calculations, either the unrelaxed Hamiltonian of the atomic model or a relaxed molecular Hamiltonian has been employed, and two-state atomic or molecular basis sets have been used. To correct for the inadequacy of atomic orbitals for close collisions at intermediate energies, the authors propose to add orbitals of the united atom at the two collision centers. With such an atomic basis set, quasimolecular behavior of the system is represented sufficiently well. The authors report on results for the collision system H^+ + He^+ for which calculations with large molecular and atomic basis sets exist.

11032 **Charge transfer of 0.8 MeV/u H^+, He^+ in various hydrocarbon gases.** Bissinger, G.; Joyce, J.M.; Laubert, R.; Varghese, S.L. (East Carolina University, Greenville, NC 27834). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1149-1151(Apr 1981). (CONF-801111—).

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Systematic variations in total single electron capture cross sections, σ_{10} (C /SUB m/ H /SUB n/), for 0.8 MeV/u H^+ and He^+ on various hydrocarbon gases are interpreted in terms of a model that incorporates intramolecular post-collision-interactions to estimate the reduction in the number of existing neutral projectiles.

11033 **K-shell ionization cross section for Ti, Fe, Cu, Zr, and Ag.** Benka, O.; Geretschlager, M. (Johannes-Kepler-Universitat Linz, A-4040 Linz/ Auhof). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1095-1097(Apr 1981). (CONF-801111—).

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Absolute K-shell ionisation cross sections have been measured for thin targets of Ti, Fe, Cu, Zr and Ag for protons in the energy range 85-790 keV and for thin targets of Ti, Fe and Cu for He ions in the energy range 190-750 keV. In addition the relative variation of the cross sections with energy has been determined with high accuracy. The experimental values are compared to the perturbed stationary state approximation (CPSSR) and the semiclassical approximation (SCA). The CPSSR theory provides the best overall agreement with experimental cross sections. For higher scaled energies the CPSSR theory predicts the energy dependence of the cross sections very well but in the lower energy range it overpredicts the cross sections by as much as a factor of two and this overprediction seems to increase with Z_a at a fixed scaled energy y. The SCA theory predicts slightly too large ionisation cross sections except for the lowest £ values. The relative variation of the cross sections with energy is not well described in either energy range.

11034 **Electron capture from inner shells by fully stripped ions.** Lapicki, G. (Northern State University, Natchitoches, LA 71457). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1066-1068(Apr 1981). (CONF-801111—).

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Theories for electron capture from inner shells by fully stripped ions are compared with experiments for K-shell vacancy production. The recently developed theory goes beyond the Oppenheimer-Brinkman-Kramers (OBK) approximation since it accounts for the perturbed stationary-state (PSS) and relativistic (R) effects in the description of inner shells as well as for the Coulomb (C)-deflection of the projectile ions; at high velocities of these ions, the theory merges with the second Born approximation. Agreement with a vast amount of data is obtained without introduction of semiempirical scaling factors. The scheme of calculations, which are cast in terms of the OBK cross sections of Nikolaev only for convenience, is presented through a sample evaluation of electron capture cross sections.

11035 **Dielectronic and radiative recombination of highly stripped sulfur ions incident on argon.** Tanis, J.A.; Clark, M.; Mowat, J.R.; Shafroth, S.M.; Strait, E.N.; Swenson, J.; Willis, J.E. (University of California, Berkeley, CA 94720). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1063-1065(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The authors have measured sulfur K x-ray emission following electron capture for 70 MeV S /SUP q+/ (q=13-16) ions incident on Ar. K radiation resulting from capture was isolated by detecting coincidences between S K x rays and electron capture events. Two recombination processes which result in the emission of a K x ray were identified: dielectronic recombination, which is the inverse Auger effect, and radiative recombination, which results from capture into a high n state ($n \geq 2$). The cross section for K radiation following capture increases by more than three orders of magnitude for q = 13+ to 16+. The fraction of capture events which result in K radiation increases from 0.0004 for q = 13+ to 0.3 for q = 16+, indicating that radiative recombination becomes relatively more important for high charge states, i.e. as $q \rightarrow Z$. Possible applications to radiative loss processes in a plasma are discussed.

11036 **Electron capture by protons and deuterons.** Jones, C.; Doughty, B.M. (East Texas State University, Commerce, Texas). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1069-1071(Apr 1981). (CONF-801111—).

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Cross section measurements are reported for electron capture into the 3s state by 20-150 keV protons and deuterons incident on molecular hydrogen and deuterium. Conventional wisdom indicates that these cross sections should be nearly identical at equivalent velocities and researchers routinely use deuteron projectiles to extend proton excitation curves downward in velocity. This practice has been questioned on theoretical grounds and some investigators have reported consistent differences in cross sections for the two isotopes, however, nearly always within the experimental uncertainty of the measurements. The authors have made a systematic study of the 3s electron capture cross sections described above to check for isotopic effects. These cross sections are then compared to previous measurements reported in the literature.

11037 **L-shell ionization in proton and alpha particle collisions with argon.** Ford, A.L.; Martin, M.; Reading, J.F. (Texas A & M University, College Station, Texas 77843). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1078-1080(Apr 1981). (CONF-801111—).

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The authors report results of coupled-state calculations of argon L-shell ionization by proton and alpha particle collisions in the 100 to 500 kev/amu energy range. Their target-centered basis includes up through f-states. They have explored the angular momentum convergence and ability of our pseudostates to describe the ionization continuum by comparing to the Born calculations of Choi; excellent agreement is obtained. In the Born the authors have shown the effect of using different independent-particle target potentials; these effects are large, particularly at low energy. They propose a modification of the Hartree-Fock potential that leaves all the wavefunctions and the bound orbital energies unaltered, but that lowers the continuum by an amount that brings the L-shell ionization potentials roughly into agreement with experiment. Their coupled-states calculations show deviations from the 1st Born approximation, and are in fair agreement with experiment. A complete comparison to experiment will require the calculation of the charge transfer channel contribution to the vacancy production.

11038 Relative population of the levels of the 1s2s2p and 1s2p² configurations of argon from three electron excited atoms. Tunnell, T.W.; Bhalla, C.P. (Kansas State University, Manhattan, Kansas 66506). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1081-1083(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The possible contributions of the cascading from higher excited states to the states which can deexcite by the x-ray and Auger processes are investigated for Li-like argon. A model is developed to calculate the probability that a given excited state will eventually populate a particular lower excited state. The model requires the calculation of the transition rates of the cascading levels. Numerical results are presented for the cascade feeding of the levels of the 1s2s2p and 1s2p² configurations. The cascading levels considered belong to the 1s2snl and 1s2pnl configurations with nl = 3s,3p,...4f.

11039 Calculation of double differential cross section for fast ion and electron impact ionization of atoms. Mason, S.T. (Georgia State University, Atlanta, Georgia 30303). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1084-1088(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The theory of the energy and angular distribution of electrons ejected in electron-atom and ion-atom collisions, within the framework of Born approximation, is discussed. Particular attention is paid to the case where the incident ion carries along its own electrons. Examples are given for e, H^+, and He^+ collisions with He. It is shown that for fast collisions, excellent agreement with experiment is obtained for electron impact and fairly good agreement for proton and He^+ impact when both projectile and target ionization are taken into account.

11040 Interpretation of high-Q scattering experiments. Olson, R.E. (SRI International, Menlo Park, CA 94025). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1029-1031(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A theoretical model has been developed for the calculation of the states of ionization of target atoms after impact by an energetic high charge state ion. The calculational method is based upon using the three-body classical-trajectory Monte Carlo approach combined with the independent electron model to determine the target ionization cross sections. Calculated cross sections for rare gas targets are in qualitative agreement with experimental values for incident ion charge states of q = +4 to +54 and energies in the 1 to 5 MeV/amu range. The calculations indicate that the "gross" ionization cross sections measured using the "condenser-plate" approach can be scaled to one reduced curve for each target species by plotting cross section divided by incident ion charge state versus energy per nucleon divided by incident ion charge state.

11041 Radiative electron capture for F^{8+} and F^{9+} ions in collisions with a He gas target. Kawatsura, K.; Richard, P.; Tawara, H. (Kansas State University, Manhattan, KS 66506). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1053-1055(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The x rays from the radiative electron capture (REC) to the projectile K-shell were investigated for F^{8+} and F^{9+} ions incident on the He target atoms in the projectile energy range from 15 to 40 MeV. The peak energies of the K-REC x-ray spectra were found to decrease linearly with a decrease of the projectile energies as expected and extrapolated to the correct ls binding energies at zero velocity. According to theory the distribution width of the REC energies should be independent of the binding energy of electrons in the projectile ions. However, it is found that this width for F^{8+} ions is systematically smaller by 20% than that for F^{9+} ions. The measured REC cross sections for F^{9+} ions are slightly larger than twice those for F^{8+} ions and the total REC cross sections for F^{8+} and F^{9+} ions were found to be more than three orders of magnitude smaller than the total electron capture cross sections and the capture cross sections into excited states.

11042 Reduction of the electron capture cross-section for protons in hydrocarbon gases. Varghese, S.L.; Bissinger, G.; Joyce, J.; Laubert, R. (East Carolina University, Greenville, NC 27834). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1056-1058(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The total electron capture cross section of 0.8 3.0 MeV protons in various hydrocarbon gases (C_1H /SUB n/ C_nH /SUB n/ , n = 2 - 8) has been measured. The authors find that the electron capture cross section per carbon atom decreases as the number of carbon atoms per molecule is increased. This reduction amounts to about 7% for 3 MeV protons and is about 25% for 0.8 MeV protons. The authors find no significant change in the electron capture cross section for carbon as the number of hydrogen atoms per molecule is increased. The observed variations in the cross section can be reproduced by assuming that post-collision-interactions destroy the required velocity match between projectile and electron.

11043 Cross section for radiative electron capture (REC) by 20-80 MeV Cl ions incident on C and Cu foils. Tanis, J.A.; Mowat, J.R.; Shafroth, S.M.; Willis, J.E. (University of California, Berkeley, California 94720). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1059-1062(Apr 1981). (CONF-801111—). Contract W-7405-ENG-48.

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Radiative electron capture (REC) cross sections for 40-80 MeV Cl ions incident on thin C foils are reported and compared with previous results using Cu targets. The authors find that the measured REC cross section per K vacancy scales according to the number of "free" electrons on the target atom, i.e., those bound target electrons with a velocity much less than the incident projectile velocity. Comparison is made with the free-electron theory of Bethe and Salpeter and good agreement is obtained. Experimental and theoretical results are compared with those of Lindskog et al., and consideration is given to different ways of computing the K-shell binding energy of the projectile at the time of REC which enters into the calculation of the theoretical REC cross section in an important way.

11044 Laser spectroscopic studies of molecular ions using fast ion beam photofragment spectroscopy. Moseley, J.T. (University of Oregon, Eugene, Oregon 97403). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1190-1193(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Spectroscopic information on molecular ions is generally much more difficult to obtain than similar information on neutral molecules, due primarily to the relatively low densities of ions that can be obtained. Ion densities in typical experiments are in the range from 10^4 to 10^8 particles/cm³; densities exceeding 10^9/cm³ can be obtained only with great difficulty. Thus experiments which depend on directly detecting the absorption of radiation by molecular ions are, practically speaking, not feasible, and those which directly detect emission from molecular ions are generally difficult. The ion density problem is further complicated by the usual spread of the ion beam population over a large number of rotational, vibrational and metastable electronic states. For basically these reasons, spectroscopic knowledge of molecular ions has lagged far behind such knowledge of neutral molecules. The particular case of photodissociation is especially favorable for ion studies, since photofragment ions produced by the interaction of a laser with an ion beam can be detected with nearly unit efficiency. Advantage was taken of this fact in the pioneering studies of von Busch and Dunn, who crossed a beam of H_3^+ ions with photons from a powerful arc lamp, and measured the total cross section for photoproduction of H^+

ions, with a resolution of 200. Unfortunately, arc lamps are not powerful enough for general use in studies of ions in fast beams. However, they have proven to be very useful in ion studies using ion cyclotron resonance techniques.

6404 Fluid Physics

11045 **(INIS-mf—8639) Discharges in the inlet region of a noble gas MHD generator.** Borghi, C.A. (Technische Hogeschool Eindhoven (Netherlands)). 1 Jun 1982. 126p. NTIS (US Sales Only), PC A07/MF A01. Order Number DE83704732.

In this work the onset of the development of the non-equilibrium conductivity in the entrance region of a noble gas MHD generator is investigated both theoretically and experimentally. At low electron densities the discharge seems to be affected by a non-Maxwellian electron distribution. In Chapter II a self-consistent model of a stationary discharge in an Ar-Cs mixture at atmospheric pressure, is set up. It includes the possibility of deviations from a Maxwellian electron energy distribution. The model allows calculation of the discharge parameter at which deviation from the Maxwellian electron distribution will become important. In Chapter III the relaxation of the plasma to a new equilibrium situation following a sudden change in the electron thermal energy is calculated by a model which can take radiation and a non-Maxwellian distribution into account. In Chapter IV an Ar-Cs discharge experiment is described with plasma parameters similar to those present in the entrance region of the generator. The ionization relaxation process in a noble gas MHD generator is experimentally studied and described in Chapter V. In this chapter the relaxation ionization region with and without pre-ionization is investigated. Current voltage characteristics are obtained by varying the applied voltage or the external load. The results are confronted with the theoretical results of the non-Maxwellian model developed in Chapter II.

11046 **(LA-UR—83-2113) Pattern formation by shock processes.** Shaner, J.W. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 22p. (CONF-8305110—6). NTIS, PC A02/MF A01. Order Number DE83015249.

From Fronts, interfaces and patterns conference; Los Alamos, NM, USA (2 May 1983).

Shock waves in condensed media often produce and leave behind periodic patterns and textures. These patterns have been observed both in real time and in postmortem examination. In many cases the patterns can be related to analogous Pattern-forming mechanisms in classical fluid dynamics, such as the Rayleigh-Taylor and Helmholtz instabilities. In other cases, the textures arise from peculiarities in the dynamic stress state immediately behind the leading edge of the shock wave. Periodic waves in the interface between two shock welded metals have a close resemblance to the classical Helmholtz instability. From a practical point of view, these waves are crucial to the formation of a good bond. Impulsive acceleration of an interface can result in the Meshkov instability, which forms patterns qualitatively similar to the Rayleigh-Taylor instability driven by continuous acceleration. However, the patterned stress state left behind after a shock crosses a perturbed interface can result in perturbation growth for shock propagation in either direction across the interface. Even in homogeneous media, the non-hydrostatic component of the stress behind a shock can drive a pattern forming instability. Adiabatic shear banding has been proposed as a mechanism to explain both the patterns observed in shock-compressed and recovered metal samples and the apparent loss of macroscopic shear strength of shocked ceramics. New optical photographs of shocked quartz support this mechanism. 27 references.

11047 **(LA-UR—83-3523) Stability of planar multifluid plasma equilibria by Arnold's method.** Holm, D.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 27p. (CONF-8307112—1). NTIS, PC A03/MF A01. Order Number DE84004332.

From American Mathematical Society research conference on fluids and plasmas: geometry and dynamics; Boulder, CO, USA (17 Jul 1983).

A method developed by Arnold to prove nonlinear stability of certain steady states for ideal incompressible flow in two dimensions is extended to the case of barotropic, compressible, multifluid plasmas. This extension is accomplished by constructing conserved functionals derived from degeneracy of Poisson brackets. The results are applied to planar shear flows of the plasma.

11048 **(UCID—19960) High frequency acoustic instabilities in heated fluids.** Chin, R.C.Y.; Garrison, J.C.; Levermore, C.D.; Wong, J. (Lawrence Livermore National Lab., CA (USA)). 19 Dec 1983. Contract W-7405-ENG-48. 37p. NTIS, PC A03/MF A01. Order Number DE84005114.

The hydrodynamic equations describing the evolution of a fluid which is homogeneously heated, either by irradiation or by internal reactions, have a solution with constant density, zero velocity and time-dependent temperature. Conditions governing the stability of this solution with respect to high-frequency acoustic perturbations are obtained. The frequency ω of the perturbation satisfies $\omega t/sub\ w/ >> 1$, where t/sub w/ is a characteristic heating time. Stability estimates are made for the early heating stage where cooling mechanisms can be neglected, and for the steady-state phase where heating and cooling mechanisms exactly balance. The estimates are made in two ways: (1) a linearized calculation, employing two-time perturbation theory, which includes the dissipative effect of heat conductivity; and (2) a calculation which neglects conductivity but includes the leading nonlinear wave interactions. The true instability growth rate is bounded by the smaller of these estimates. For a simple model of the heating mechanism during the early heating, bounds on the growth rates are obtained which show that this solution is at worst only weakly unstable. A similar treatment of the steady-state phase shown that this solution is susceptible to exponentially growing instabilities. Values of the growth rate are given for the model employed.

11049 **Inertia effects on the dynamics of a disk levitated by incompressible laminar fluid flow.** Warinner, D.K.; Pearson, J.T. (Argonne National Laboratory, Argonne, IL 60439). *Journal of Engineering for Power;* **105**: No. 3, 643-653(Jul 1983).

This paper develops a nonlinear ordinary differential equation (O.D.E.) of motion for a disk parallel to a flat plate and levitated by incompressible laminar flow of fluid supplied from a central orifice. The fluid's inertia, reflected in high mass flow rates, is accounted for. The transient flow velocity and pressure field are found by iterative integration of the Navier-Stokes equation to determine the O.D.E. for the time-dependent height of the disk (or fluid film thickness). The film thickness is found by not only numerically integrating the O.D.E., but also by linearizing the equation to obtain a closed-form solution. The results of this combined squeeze film, source-flow case compare favorably with experimental data presented which span cases from negligible inertia (viscous dominance) to cases of inertia dominance. Fortunately, the closed-form solution differs only slightly from the numerical solution; this provides relatively accurate expressions for the frequencies and damping coefficients in terms of the geometry, load (or weight of disk), mass flow rate, and the fluid properties.

6450 High Energy Physics

11050 **(JINR—D-1,2-81-728) Multiquark interactions and quantum chromodynamics.** (Joint Inst. for Nuclear Research, Dubna (USSR)). 1981. 369p. (CONF-8109144—). NTIS (US Sales Only), PC A16/MF A01. Order Number DE84780054.

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodymamics; Dubna, USSR (15 Sep 1981).

Separate entries were made in the data base for the papers presented. (WHK)

6451 Particle Interactions And Properties - Experimental

REFER ALSO TO CITATION(S) 10507, 11086

11051 (ANL-HEP-CP—83-50) Results from HRS at PEP. Weiss, J.M. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 44p. (CONF-8307109—2). NTIS, PC A03/MF A01. Order Number DE84003630.

From 11. SLAC summer institute conference on particle physics - dynamics and spectroscopy at high energy; Stanford, CA, USA (18 Jul 1983).

The High Resolution Spectrometer (HRS) has been collecting data at PEP since the end of 1981 and has now accumulated 120 pb^{-1} of integrated luminosity. The results of analyses are presented in the following areas: (1) QED and electroweak tests, (2) scalar electron search, (3) inclusive hadron production, (4) D^0, D^+ and D^* production, and studies of quark fragmentation. Only the 20 pb^{-1} of integrated luminosity obtained during our first year of running has been completely analyzed and this provides the data sample for most of the above topics. For others a preliminary analysis of a total sample of 80 pb^{-1} is reported. 20 references.

11052 (CONF-8311112—1) β-decay asymmetry of the free neutron. Bopp, P.; Dubbers, D.; Klemt, E.; Last, J.; Schuetze, H.; Weibler, W.; Freedman, S.J.; Schaerpf, O. (Argonne National Lab., IL (USA); Heidelberg Univ. (Germany, F.R.). Physikalisches Inst.; Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)). 1983. Contract W-31-109-ENG-38. 7p. NTIS, PC A02/MF A01. Order Number DE84004035.

From Workshop on reactor based fundamental physics; Grenoble, France (7 Nov 1983).

The β-decay of polarized neutrons has been studied with the new superconducting spectrometer PERKEO at the ILL. The energy dependence of the β-decay asymmetry has been measured for the first time. From the measured β-asymmetry parameter we obtain a new value for the ratio of weak coupling constants g/sub A//g/sub V/. 11 references.

11053 (CONF-8311113—1) Tensor polarization in pion-deuteron elastic scattering. Holt, R.J. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 25p. NTIS, PC A02/MF A01. Order Number DE84003995.

From LAMPF users group report meeting; Argonne, IL, USA (6 Nov 1983).

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The angular dependence of the tensor polarization t_{20}/sup lab/ of recoiling deuterons in π-d elastic scattering was measured as a function of incident pion energy in the range 134 to 256 MeV. No evidence was found for rapid energy or angular dependences in t_{20}/sup lab/. The results agree most favorably with theoretical calculations in which the P_{11} π-N amplitude has been removed altogether. This agreement is consistent with a small effect of pion absorption on the elastic channel. 14 references.

11054 (EFI—522(9)-82) Geometric reconstruction of events in the experiment on the investigation of the recoil proton polarization in the π^0-meson photoproduction. Skhtoryan, E.M. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 15p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704597.

A set of programs for processing the data on the investigation of the recoil proton polarization in the reactions of π^0-meson photoproduction by polarized photons is described. The basic problems of identifying and selecting the cases of scattering and storage of this information for the further processing on large computers in order to determine the degree of polarization of recoil protons are considered.

11055 (IC—82/215) Physics with 100-1000 TeV accelerators. Salam, A. (International Centre for Theoretical Physics, Trieste (Italy)). Oct 1982. 21p. (CONF-820980—6). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704489.

From European Committee of future accelerators - the challenge of ultra-high energies conference; Oxford, UK (27 Sep 1982).

Some thoughts are presented about high energy physics topics which may be connected with future accelerator physics. Discussed are the physics associated with Higgs in grand unifying theories and the physics associated with supersymmetry and with ideas about preons.

11056 (LAL—83-09) High transverse momentum π^0 and direct photon photoproduction. Auge, E. (Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire; Paris-11 Univ., 91 - Orsay (France)). May 1983. 182p. (In French). NTIS (US Sales Only), PC A09/MF A01. Order Number DE84750294.

A measurement of the high transverse momentum π^0 photoproduction cross section, obtained from the NA14 experiment data is presented. The VDM model alone cannot explain the results, which are found to be compatible with first order QCD predictions. A clear direct photon signal is seen. This signal cannot be entirely explained by the QED Compton effect. It allows to reject the integer charge quarks hypothesis within the naive parton model frame. A reconstruction method for energetic π^0 in lead-glass, based on the electromagnetic shower description using a simple model is described.

11057 (LBL—16736) Search for right-handed currents in muon decay. Stoker, D.P. (Lawrence Berkeley Lab., CA (USA)). Sep 1983. Contract AC03-76SF00098. 35p. (CONF-8307109—3). NTIS, PC A03/MF A01. Order Number DE84002901.

From 11. SLAC summer institute conference on particle physics - dynamics and spectroscopy at high energy; Stanford, CA, USA (18 Jul 1983).

Limits are reported on right-handed currents, based on precise measurement of the e^+ spetrum end point in μ^+ decay. Highly polarized muons from the TRIUMF surface beam were stopped in metal foils within a 1.1 T spin-holding longitudinal field or a 70 G spin-precessing field. For the spin-held data, the V-A rate vanishes in the beam direction at the end point. Measurement of this sets the 90% confidence limits xi P/sub mu/δ/rho $>$ 0.9959 and M(W/sub R/) $>$ 380 GeV, where W/sub R/ is the possible right-handed gauge boson. The μ SR signal amplitude of the spin-precessed data independently sets the limits xi P/sub μ/δ/rho $>$ 0.9918 and M(W/sub R/) $>$ 320 GeV. Limits on non-(V-A) currents, familons, and composite leptons are also presented. 27 references.

11058 (SLAC—264) Measurement of the hadronic cross section in electron-positron annihilation. Clearwater, S. (Stanford Linear Accelerator Center, CA (USA)). Nov 1983. Contract AC03-76SF00515. 62p. NTIS, PC A04/MF A01. Order Number DE84005017.

Portions are illegible in microfiche products. Original copy available until stock is exhausted; Thesis.

This thesis describes the most precise measurement to date of the ratio R, the hadronic cross section in lowest order electron-positron annihilation to the cross section for muon pair production in lowest order electron-positron annihilation. This experiment is of interest because R is a fundamental parameter that tests in a model independent way the basic assumptions of strong interaction theories. According to the assumptions of one of these theories the value of R is determined simply from the electric charges, spin, and color assignments of the produced quark-pairs. The experiment was carried out with the MAgnetic Calorimeter using collisions of 14.5 GeV electrons and positrons at the 2200m circumference PEP storage ring at SLAC. The MAC detector is one of the best-suited collider detectors for measuring R due to its nearly complete coverage of the full angular range. The data for this experiment were accumulated between February 1982 and April 1983 corresponding to a total event sample of about 40,000 hadronic events. About 5% of the data were taken with 14 GeV beams and the rest of the data were taken with 14.5 GeV beams. A description of particle interactions and experimental considerations is given.

11059 (SLAC-PUB—3245) Latest results from the MARK II at PEP. Lockyer, N. (Stanford Linear Accelerator Center, CA (USA)). Oct 1983. Contract AC03-76SF00515. 25p. (CONF-8307109—1). NTIS, PC A02/MF A01. Order Number DE84003858.

From 11. SLAC summer institute conference on particle physics - dynamics and spectroscopy at high energy; Stanford, CA, USA (18 Jul 1983).

We present single photon annihilation results from the MARK II detector at PEP based on ~ 100 pb^{-1} of integrated luminosity taken at a center of mass energy $\sqrt{s}$ = 29 GeV. A study of inclusive leptons for momenta ≧ 2 GeV/c yield the average semileptonic branching ratios of bottom (b) and charm (c) quarks and information about the b fragmentation function. A measurement of the bottom hadron lifetime is presented based on a study of the prompt lepton impact parameters. In addition we report on a precise measurement of the tau lifetime and an updated D^0 lifetime. We also present a search for supersymmetric electrons, weak neutral current couplings from leptons and bottom particles and evidence for K*'s at PEP. 43 references.

11060 (SLAC-PUB—3247) Charm and beauty lifetime measurements with the MARK II vertex detector. Jaros, J.A. (Stanford Linear Accelerator Center, CA (USA)). Oct 1983. Contract AC03-76SF00515. 6p. (CONF-8308145—1). NTIS, PC A02/MF A01. Order Number DE84003862.

From Workshop on search for heavy flavors; Como, Italy (29 Aug 1983).

We have measured the lifetime of the D^0 meson and the average lifetime of b-flavored hadrons with the MARK II vertex detector at PEP. We find tau/sub D°/ = (4.0 +- 1.4/1.1 +- 1.0) x 10^{-13} sec and tau/sub b/ = (12.0 +- 4.5/3.6 +- 3.0 x 10^{-13} sec. 11 references.

11061 (SLAC-PUB—3262) Mark III results from SPEAR. Toki, W. (Stanford Linear Accelerator Center, CA (USA)). Nov 1983. Contract AC03-81ER40050. 25p. (CONF-8307109—4). NTIS, PC A02/MF A01. Order Number DE84005326.

From 11. SLAC summer institute conference on particle physics - dynamics and spectroscopy at high energy; Stanford, CA, USA (18 Jul 1983).

First results from the MARK III detector at SPEAR are presented based on 2.7 million J/psi decays. The eta/sub c/ is observed in three modes, J/psi → γeta/sub c/, (eta/sub c/ → rho anti rho, eta$\pi^+\pi^-$, and phi phi). Using the phi phi mode, the eta/sub c/ spin-parity is determined to be 0^-. The known radiative J/psi decays J/psi → γf(f → $\pi^+\pi^-$), γeta'(eta' → γrho°, eta$\pi^+\pi^-$), γf'(f' → kappa⁺kappa⁻), γtheta(theta → kappa anti kappa), and γiota(iota → πkappa anti kappa) are observed and their branching ratios found to be in agreement with previous measurements. In the J/psi → γkappa⁺kappa⁻ mode a new state is observed at 2.22 GeV and in the J/psi → γγrho° and γeta$\pi^+\pi^-$ modes evidence for new structures near 1.4 GeV is presented. 29 references.

11062 Weak neutral currents in e^+e^- collisions at $\sqrt{s}$ = 29 GeV. Levi, M.E.; Blocker, C.A.; Strait, J.; Abrams, G.S.; Amidei, D.; Baden, A.R.; Boyarski, A.M.; Breidenbach, M.; Burchat, P.; Burke, D.L. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305; Lawrence Berkeley Laboratory and Department of Physics, University of California, Berkeley, California 94720; and Department of Physics, Harvard University, Cambridge, Massachusetts 02138). *Physical Review Letters;* **51**: No. 21, 1941-1944(21 Nov 1983). Contract AC03-76SF00515;W-7405-ENG-48;AC03-76SF00098.

The differential cross sections for lepton pair production in e^+e^- annihilation at 29 GeV have been measured and found to be in good agreement with the standard model of the electroweak interaction. With the assumption of e-μ-tau universality, the weak neutral-current couplings are determined to be g/sub a/² = 0.23 +- 0.05 and g/sub upsilon/² = 0.03 +- 0.04.

11063 Measurement of the nucleon structure function in iron using 215- and 93-GeV muons. Clark, A.R.; Johnson, K.J.; Kerth, L.T.; Loken, S.C.; Markiewicz, T.W.; Meyers, P.D.; Smith, W.H.; Strovink, M.; Wenzel, W.A.; Johnson, R.P. (Physics Department and Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **51**: No. 20, 1826-1829(14 Nov 1983). Contract AC03-76SF00098;AC02-76CH03000;AC02-76ER03072.

This Letter presents measurements of the nucleon structure function $F_2(x,Q^2)$ based on the deep-inelastic scattering of 215- and 93-GeV muons in the iron multimuon spectrometer at Fermilab. With use of a lowest-order QCD calculation, a value of Λ/sub LO/ = 230 +- 40(stat.) +- 80(syst.) MeV/c is found.

11064 Analyzing powers and spin correlations A/sub N/N and A/sub L/L for pp→npπ^+ at 650 and 800 MeV. Bhatia, T.S.; Boissevain, J.G.J.; Jarmer, J.J.; Silbar, R.R.; Simmons, J.E.; Glass, G.; Hiebert, J.C.; Kenefick, R.A.; Northcliffe, L.C.; Tippens, W.B. . (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review [Section] C: Nuclear Physics;* **28**: No. 5, 2071-2074(Nov 1983).

We report first measurements of the spin correlation parameters, A/sub N/N and A/sub L/L, for pp→npπ^+ above the Δ-production threshold. Our results for this dominant inelastic channel are in good agreement with a theoretical model that does not include any dibaryon resonances.

6452 Particle Interactions And Properties - Theoretical

REFER ALSO TO CITATION(S) 10200, 11092, 11104

11065 (BNL—33928) Montecarlo studies of t quarks. Protopopescu, S.D. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 4p. (CONF-8308131—4). NTIS, PC A02/MF A01. Order Number DE84004180.

From 3. international conference on physics in collision; Como, Italy (31 Aug 1983).

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In this report I describe some of the results of a Montecarlo study with the Program ISAJET done in collaboration with S. Aronson, F. Paige and D. Weygand at BNL. Top quarks can be produced by QCD processes such as q anti q → t anti t or gg → t anti t or from the decay W/sup +-/ → t anti b (anti tb); the cross section depends on the t mass and the center of mass energy. At $\sqrt{s}$ = 540 GeV W decays produce more t quarks if 40 GeV < m/sub t/ < 60 GeV than QCD processes because the W branching ratio does not decrease rapidly with the t mass. The branching ratio is given by B = γ/(3 + γ) where γ = (1 - m/sub t//m/sub W/)²)² (1 + 1/2 (m/sub t//m/sub W/)²)² from which one obtains B = 21% for m/sub t/ = 30 GeV and B = 8.7% for m/sub t/ = 60 GeV. In Figure 1 we show the expected cross section as a function of m/sub t/ at $\sqrt{s}$ = 540 GeV and at $\sqrt{s}$ = 2 TeV. The W decay process is clearly dominant at $\sqrt{s}$ = 540 GeV and also at $\sqrt{s}$ = 2 TeV over a more limited mass range. To detect the top quarks the obvious signal to use is high transverse momentum leptons from semi-leptonic decays, B (t → be nu) = B (t → bμ nu) = 1/9. Note, however, that this relatively large branching ratio becomes negligible if there exists a charged Higgs lighter in mass than the t quark. To study the characteristics of the top quark jets we generated 10^4 events anti p p → W + X, W → t anti b, for m/sub t/ = 30 GeV and m/sub t/ = 60 GeV. We then let t → bl nu and the b quark jets are fragmented using Field-Feynman fragmentation including leading-log QCD gluon emission; in this process the b jet mass can be significantly higher than m/sub b/.

11066 (BNL—33952) Jets in hadronic reactions. Paige, F.E. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 42p. (CONF-8309196—1). NTIS, PC A03/MF A01. Order Number DE84004293.

From Meeting of the Division of Particles and Fields; Blacksburg, VA, USA (15 Sep 1983).

Recent experimental data on the properties of jets in hadronic reactions are reviewed and compared with theoretical ex-

pectations. Jets are clearly established as the dominant process for high E/sub T/ events in hadronic reactions. The cross section and the other properties of these events are in qualitative and even semiquantitative agreement with expectations based on perturbative QCD. However, we can not yet make precise tests of QCD, primarily because there are substantial uncertainties in the theoretical calculations. 45 references. (WHK)

11067 **(BNL—33970) Electroweak interactions.** Marciano, W.J. (Brookhaven National Lab., Upton, NY (USA)). 1983. Contract AC02-76CH00016. 13p. (CONF-8308101—8). NTIS, PC A02/MF A01. Order Number DE84004290.

From International symposium on lepton and photon interactions at high energies; Ithaca, NY, USA (4 Sep 1983).

An overview of the 18 independent parameters of the standard SU(3)/sub c/ x SU(2)/sub L/ x U(1) model is given. Neutral current phenomenology and sin² theta/sub W/, W/sup +-/ and Z⁰ masses, and testing the great desert hypothesis are discussed. The need for precise measurements in elementary particle physics is emphasized. (WHK)

11068 **(CEA-CONF—6684) Q.C.D. estimates of hadronic cross sections.** Navelet, H.; Peschanski, R. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Mar 1983. 8p. (CONF-830377—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750300.

From 18. Rencontre de Moriond conference; La Plagne, France (19 Mar 1983).

Portions are illegible in microfiche products.

Estimates for hadron-hadron cross-sections are made using the leading log approximation of Q.C.D. The rise of the total inelastic pp cross-sections at high energy is reproduced, thanks to the competition between the small parton-parton interaction and the large multiplicity of gluons predicted by Q.C.D..

11069 **(IC—80/47) Unity behind diversity in nature.** Pati, J.C. (International Centre for Theoretical Physics, Trieste (Italy)). Mar 1980. 28p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704478.

This is a lecture delivered to general audiences of physicists as well as non-physicists at institutions in India, which are listed at the end. The central theme of the lecture is unity behind diversity in Nature. The main topic of the lecture concerns the unity of the basic forces of Nature and the unity of all basic matter, which are used to illustrate the central theme.

11070 **(IC—82/98) Gauge bosons as composites of fermions.** Akdeniz, K.G.; Arik, M.; Hortacsu, M.; Pak, N.K. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704492.

Non-abelian gauge theories are obtained as effective theories of certain models which at the Lagrangian level contain only spinor fields.

11071 **(IC—82/161) Abrupt onset of scaling violation.** Chela-Flores, J. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704480.

Paper copy only, copy does not permit microfiche production4 refs.

We present a novel interpretation of deep inelastic scattering data. In our approach the Q^2 evolution from perfect scaling starts with a discontinuity in the structure function F_2, due to strong correlations amongst the sea-quarks. This effect is compatible with the data gathered in the kinematic region available so far, but will bring new predictions in the kinematic region which will be reached in the near future. Precise experimental suggestions are indicated so as to distinguish between QCD incorporating strong correlations leading to abrupt scaling violations, from current QCD without such correlations leading to a smooth logarithmic scale breaking.

11072 **(IC—82/174) Magnetic monopoles and baryon decay.** Pak, N.; Panagiotakopoulos, C.; Shafi, Q. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 9p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704481.

The scattering of a non-relativistic quark from a GUT monopole is affected by the anomalous magnetic moment of the quark. In order that monopole catalysis of baryon decay can occur, it must be assumed that the anomalous magnetic moment decreases sufficiently rapidly below the QCD scale.

11073 **(IC—82/180) Quark approach to Santilli's conjecture on hadronic structure - II.** Animalu, A.O.E. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704484.

In this paper, we continue an earlier investigation of an exactly soluble relativistic Bohr-type model of the internal structure of the proton (three-quark baryon system) and the pion (quark-antiquark meson system), based on a realization of Santilli's conjecture that the hadronic constituents are extended (non-pointlike) objects. The model is abstracted from an expansion of a Yukawa-type potential between the valence quarks and a massive core, in which the meson or gluon exchange term has the effect of reducing the effective Bohr radius for binding to a value less than the radius of the strong charge sphere (or Compton wavelength) of each constituent, so that appreciable overlap of charge volumes occurs, to within a typical distance of order 0.25F or 1/(800 MeV) in qqq-system, and order 1/(1200 MeV) in qq-bar-system, which are comparable to gluon masses, msub(G) approx.= 800 to 1200 MeV, required by the lattice QCD and the MIT Bag Model. Based on the assumptions that the ground state of the proton has $1s^22s$ valence quark configuration, the non-strange quark mass is msub(p)/3, and the dimensionless strong coupling constant of the Yukawa-type potential is $g^2=1$, the mass of the proton core is determined self-consistently to be 2470 MeV, exactly balancing the quark binding energy so that the valence quarks appear free. The model correctly predicts the masses of the well-known resonant states of the proton with Jsup(P)=1/2⁺ as excited states associated with the configuration $1s2s^2$ and predicts an upper bound (spectroscopic limit) for the mass of the excited states of the proton in ns^2ms configuration, as n→infinity and m→infinity, to be 3409 MeV. Based on a generalization of the model to qq-bar-systems, an upper bound (spectroscopic limit) for the mass of qq-bar in ns^2 configuration, as n→infinity, is found to be 3096 MeV, which is the mass of the J/psi-meson.

11074 **(IC—82/183) Ratio of lifetimes for the D^+ and D^0 mesons.** Ward, B.F.L. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 14p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704485.

Using the SLAC lattice QCD theory, we derive an effective interaction density for the process c+u-bar→s+d-bar+G, where G is a gluon. In this way, we calculate the ratio of lifetimes for the D^+ and D^0 mesons. Our result for this ratio is close to unity.

11075 **(IC—82/191) Perhaps a new unified scaling variable for describing the low- and high-psub(T) processes.** Amaglobeli, N.S.; Esakia, S.M.; Khujadze, A.M.; Kuratashvili, G.O.; Topuria, T.P.; Garsevanishvili, V.R. (International Centre for Theoretical Physics, Trieste (Italy)). Sep 1982. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704486.

A new scale invariant parametrization of single particle inclusive spectra in hadron-hadron collisions is proposed. The variable introduced goes over to the well-known scaling variables xsub(F)=2psub(z)/√s and xsub(T)=2psub(T)/√s in the high-psub(z) and high-psub(T) limits, respectively. Some "critical" surfaces are found in the phase space of produced particles, which determine the boundary of the regions with significantly different characteristics (in particular, angular distributions) of generated particles. In one of these two regions a naive statistical model seems to be in good agreement with the data, whereas it does not work in the other region.

11076 **(IC—82/209) High-energy pp and p-barp scattering and the model of geometric scaling.** Fischer, J.; Jakes, P.; Novak, M. (International Centre for Theoretical Physics, Trieste (Italy)). Oct 1982. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704488.

The model of geometric scaling is used to predict the evolution of the diffractive dip-peak structure of pp and p-barp differential cross-sections with increasing energy. Previous calculation for pp scattering made by Dias de Deus and Kroll is carried out with new data and their predictions confirmed. Recent data on p-barp scattering are used to make an analogous analysis for this process as well. It turns out that the p-barp differential cross-section behaves analogously, the main difference being that, in the p-barp case, the dip-peak structure should not completely disappear with increasing energy.

11077 **(IPNO-TH—82-22) Cross section for inclusive deep inelastic scattering in the impulse approximation: scale invariance and mass problems.** Nataf, R. (Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire). Jun 1982. 42p. (In French). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750299.

The non-perturbative calculation of inclusive D.I.S. is made in a parton model different from the "naive" one upon two points: 1) the struck quark is off-shell (impulse approximation), 2) kinematical correlations between partons are taken into account. At low Q^2 (4 to 20 GeV^2) the best target mass correction is the Nachtmann one.

11078 (JINR-D—1,2-81-728, pp 51-62) **Effective interactions of quarks and static hadron properties.** Gerasimov, S.B. 1981. (In Russian). NTIS (US Sales Only), PC A16/MF A01. (CONF-8109144—).

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics; Dubna, USSR (15 Sep 1981).

Portions are illegible in microfiche products8 refs.

Within the framework of the relativistic model with universal potential of quark interaction hadron static properties are investigated. The model is based on the choice of the universal potential of qq^- interaction, determining effective quark interaction in multiparticle systems. The calculation of masses, magnetic moments radiative meson decay widths baryons and exotic multiquark hadrons is performed. Quark dimensions and "hyper-- fine" structure of hadron radial excitations are discussed as well.

11079 (JINR-D—1,2-81-728, pp 83-102) **Multiquark resonance state.** Shakhbazyan, B.A. 1981. (In Russian). NTIS (US Sales Only), PC A16/MF A01. (CONF-8109144—).

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics; Dubna, USSR (15 Sep 1981).

A review of experimental results on multiquark resonance states is presented. Information on resonances is obtained in the course of studying the $n^{12}C$ interaction. Analysed in detail are invariant mass spectra of Λp-dibaryons with quantum numbers I=1/2, Y=1, B=2, S=-1, Λpπ-dibaryons with quantum numbers I=3/2, Y=1, B=2, S=-1 and $\Lambda\pi^{+-}\pi^{+-}$-baryons with quantum numbers I=2, Y=0, B=1, S=-1. The data on particle mass and production cross sections are given. From other possible resonances are singled out dibaryons with quantum numbers I=0, Y=0, B=0, S=-2 in the ΛΛ invariant mass spectrum and tribaryons with quantum numbers I=1, 2, Y=1, B=3, S=-2 in the ΛΛp invariant mass spectrum. The hypercharge selection rule is formulated: in weak gravitational fields the hypercharge of hadron resonances must not exceed a unit.

11080 (JINR-D—1,2-81-728, pp 110-115) **Evident manifestations of four-quark states.** Achasov, N.N.; Devyanin, S.A.; Shestakov, G.N. (AN SSSR, Novosibirsk. Inst. Matematiki). 1981. (In Russian). NTIS (US Sales Only), PC A16/MF A01. (CONF-8109144—).

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics; Dubna, USSR (15 Sep 1981).

A possibility of interpretation of some known resonances in the framework of the four-quark model is considered. To the above resonances S*(980) and delta(980) are related. If S*(980) and delta(980) are four-quark states, then their two-photon decay widths should be values by the order less than those of known two-quark mesons (n', f) as well as the widths theoretically predicted in two-quark models. It is pointed out that the discovery of the two-photon tensor meson production is to testify in favour of the existence of four-quark states.

11081 **(LBL—16819) Meson radiation from quark-gluon plasma.** Matsui, T.; Banerjee, B.; Glendenning, N.K. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 14p. (CONF-8310245—1). NTIS, PC A02/MF A01. Order Number DE84005199.

From Conference on Hadron substructure in nuclear physics; McCormick's Creek S.P., IN, USA (19 Oct 1983).

Meson formation and radiation at the surface of quark-gluon plasma are studied by making use of the chromoelectric flux tube model. The effect of the surface meson radiation on the hydroexpansion of the plasma fluid is also discussed.

11082 **(PB—83-255075) Lepton spectroscopy.** Bullock, F.W.; Devenish, R.C.E. (Oxford Univ. (UK). Nuclear Physics Lab.). 1983. 185p. NTIS, PC AE10/MF E10.

The complete body of knowledge of the lepton spectrum as it is known today is presented and critically examined. While the emphasis is primarily on the experimental determination of leptonic properties, we also summarize the many theoretical endeavors that have enriched and guided the field, and continue to do so. Complete accounts are given of the current situation on neutrino mass determination, on neutrino oscillations and on the properties of the tau and search for its associated neutrino. The subject of lepton conservation is discussed and all the experimental evidence for nonconservation collected together. The search for leptons other than those belonging the three familiar generations is reviewed. Finally, a brief account is given of the limits on leptonic properties imposed by cosmological arguments.

11083 **Model for the structure of point-like fermions: Qualitative features and physical description.** Fryberger, D. (Stanford Linear Accelerator Center, Stanford University, Stanford, California 94305). *Foundations of Physics;* **13**: No. 11, 1059-1154(Nov 1983). Contract AC03-76SF00515.

A model for the structure of point-like fermions as tightly bound composite states is described. The model is based upon the premise that electromagnetism is the only fundamental interaction. The fundamental entity of the model is an object called the vorton. Vortons are semiclassical monopole configurations of electromagnetic charge and field, constructed to satisfy Maxwell's equations. Vortons carry topological charge and one unit each of two different kinds of angular momenta, and are placed in magnetically bound pair states having angular momentum l = 1/2. The topological charge prevents the mutual annihilation of the vorton pair. The helicity eigenstates of the vortons' intrinsic angular momenta form the basis for a set of internal quantum numbers for the pair which distinquish the different (point-like) pair states. Sixteen fourcomponent spinor states, eight leptonic and eight hadronic, are obtained. Eleven of these are identified with the quantum numbers of the experimentally known particles: e, ν/sub e/, μ, ν/sub μ/, tau, ν/sub tau/; p, n, Λ, Λ/sub c/, and b. Thus one new heavy lepton with its neutrino and three new quark states are predicted. Some possibilities for the extension of this model are discussed.

6453 Particle Invariance Principles And Symmetries

REFER ALSO TO CITATION(S) 11055, 11071, 11099, 11100, 11105, 11112

11084 **(IC—82/80) Broken supersymmetries in high energy physics.** Rajpoot, S.; Taylor, J.G. (International Centre for Theoretical Physics, Trieste (Italy)). Jun 1982. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704490.

The renormalisation group analysis of the running coupling constants in the hierarchies of N-extended supersymmetric simple unification schemes is presented. For proton lifetimes of order 10^{30}

years the scale(s) of supersymmetry breaking are of order 10^{12} GeV. In local realisations of such supersymmetries, such high mass-scales lead to gravitinos with masses in the 10^5 GeV range. Gravitinos this massive decay too long before the time of helium synthesis to be of relevance in the early universe.

11085 **(IC—82/99) Approach towards minimality - supersymmetry at the preonic or pre-preonic level.** Pati, J.C.; Salam, A. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 40p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704493.

Believing that a fundamental theory ought to be manifestly minimal, elegant and somehow unique, we make a beginning in this note in arriving at a minimal system of fundamental substructures (pre-preons), which could give rise to preons of the flavon-chromon type proposed some time ago. Our approach points naturally to a need for supersymmetry at the level of preons or pre-preons. Spin-1/2 flavons and spin-0 chromons appear to receive their simplest interpretation as Fermi-Bose partners of a supersymmetric theory; the emergence of the concepts of flavour and colour, in this picture, is synonymous with supersymmetry-breaking. An alternative picture, in which flavons and chromons arise as Fermi and Bose-components of different superfields and thereby permit the emergence of the concepts flavour and colour prior to supersymmetry-breaking, is also considered. A simple pre-preonic model presented here suggests three quark-lepton families with tau being distinct from e and μ in some of its interactions. The ideas of building supersymmetric Yang-Mills theories with pre-preons and supergravity-theories of preons as composite theories are considered.

11086 **(LA-UR—83-3250) Time reversal invariance in polarized neutron beta decay.** Bowles, T.J.; Moses, J.D.; Sunier, J.; Brown, R.E.; Lisowski, P.; Mampe, W.; Liaud, P. (Los Alamos National Lab., NM (USA); Institut Max von Laue - Paul Langevin, 38 - Grenoble (France); Centre Universitaire de Chambery, 73 (France)). 1983. Contract W-7405-ENG-36. 5p. (CONF-8311112—2). NTIS, PC A02/MF A01. Order Number DE84003781.

From Workshop on reactor based fundamental physics; Grenoble, France (7 Nov 1983).

Measurements of the triple correlation σ/sub n/(P/sub e/ x P/sub nu/) in polarized neutron beta decay provide a test of time reversal violation. An experiment that will substantially improve the current limits on this correlation is discussed. 11 references.

11087 **(LBL—16747) Chiral anomalies and differential geometry.** Zumino, B. (Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 25p. (CONF-8308144—1). NTIS, PC A02/MF A01. Order Number DE84004637.

From Lectures in physics; Les Houches, France (1 Aug 1983).

Some properties of chiral anomalies are described from a geometric point of view. Topics include chiral anomalies and differential forms, transformation properties of the anomalies, identification and use of the anomalies, and normalization of the anomalies. 22 references. (WHK)

11088 **Enhanced T-nonconserving nuclear moments.** Haxton, W.C.; Henley, E.M. (Theoretical Division, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review Letters;* **51**: No. 21, 1937-1940(21 Nov 1983).

T- and P-nonconserving nuclear moments induced by a parity- and CP-nonconserving interaction in the QCD Lagrangian are discussed. The mixing of nearly degenerate opposite-parity ground-state doublets in certain deformed nuclei leads to electric dipole and magnetic quadrupole moments 10^1—10^3 and 10^3—10^4 times larger, respectively, than those generated by the unpaired valence nucleon.

11089 **Parametrization of the Kobayashi-Maskawa matrix.** Wolfenstein, L. (Department of Physics, Carnegie-Mellon University, Pittsburgh, Pennsylvania 15213). *Physical Review Letters;* **51**: No. 21, 1945-1947(21 Nov 1983).

The quark mixing matrix (Kobayashi-Maskawa matrix) is expanded in powers of a small parameter λ equal to sinθ/sub c/ = 0.22. The term of order λ^2 is determined from the recently measured B lifetime. Two remaining parameters, including the CP-nonconservation effects, enter only the term of order λ^3 and are poorly constrained. A significant reduction in the limit on ϵ'/ϵ possible in an ongoing experiment would tightly constrain the CP-nonconservation parameter and could rule out the hypothesis that the only source of CP nonconservation is the Kobayashi-Maskawa mechanism.

6454 Field Theory

REFER ALSO TO CITATION(S) 11063, 11071, 11084, 11085, 11088, 11167

11090 **(ANL-HEP-CP—83-61) Scales and upper bounds of classical monopole solutions.** Zachos, C.K. (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 6p. (CONF-8310227—1). NTIS, PC A02/MF A01. Order Number DE84004005.

From Monopole '83 conference; Ann Arbor, MI, USA (6 Oct 1983).

The masses of GUT monopoles are bounded from above by a limit roughly twice the Prasad-Sommerfield limit, and thus depend only weakly on Higgs masses and the electroweak scale. 7 references.

11091 **(IC—80/1) Towards a dynamical preon model.** Krolikowski, W. (International Centre for Theoretical Physics, Trieste (Italy)). Jan 1980. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704476.

We discuss further the recently proposed "primordial" quantum chromodynamics, where a massive Fermi-Bose couple of two colour triplets delta and chi of spin 1/2 and 0, respectively, and of equal charge - 1/3 interacts with a colour octet of massless vector gluons. The "preons" delta and chi form bound states νsub(e) = delta chi-bar, e=delta(chichi)sub(P) (colour singlets) and u=delta-bar chi-bar, d=delta-bar (chichi)sub(P) (colour triplets). Other preon bound states also exist and are briefly reviewed.

11092 **(IC—80/14) Lepton and quark families as quantum-dynamical systems.** Krolikowski, W. (International Centre for Theoretical Physics, Trieste (Italy)). Feb 1980. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704477.

We conjecture that the observed four lepton and quark families (νsub(N)), (esub(N)) and (usub(N)), (dsub(N)), if considered in the space of generations N = 1,2,3..., are quantum-dynamical systems, much like particles of the first quantization are quantum-dynamical systems in the position space. We call this far-going conjecture the "zeroth quantization" and discuss its consequences for lepton and quark mass spectra.

11093 **(IC—82/14) Derivation of the conventional basis for the classical Lie algebra generators.** Karadayi, H.R. (International Centre for Theoretical Physics, Trieste (Italy)). Jan 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704434.

The explicit construction of the classical Lie algebra generators in the conventional Gell-Mann basis is derived for all irreducible unitary representations of all classical groups. The main framework is based on a description of the simple roots of the classical Lie algebras such that the inter-relations implied by the Cartan matrix of the group among these simple roots are explicit within this description.

11094 **(IC—82/50) Spontaneous compactification of a (4+d)-dimensional Kaluza-Klein theory into M_4xG/H for arbitrary G and H.** Randjbar-Daemi, S.; Percacci, R. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704444.

Einstein-Yang-Mills theory in 4+d dimensions admits a solution of the form M_4xG/H, where M_4 is Einstein and G/H is symmetric, if the gauge group is H (or larger). The gauge fields of this solution are topologically nontrivial. The symmetry group is

G_4xGxH, G_4 being the isometry group of M_4; M_4 could be Minkowski or anti-de-Sitter space.

11095 **(IC—82/52) Finite temperature SU(2) gauge theory with external magnetic field.** Fujimoto, Y.; Fukuyama, T. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 20p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704446.

We employ the heat kernel method to evaluate the effective potential of the SU(2) gauge theory (with scalar triplet) when both external magnetic field and temperature are applied to it. The calculation is performed in high temperature approximation.

11096 **(IC—82/56) Renormalization of the QEMD of a dyon field.** Panagiotakopoulos, C. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704447.

A renormalized quantum electromagnetodynamics (QEMD) of a dyon field is defined. Finite and n independent answers can be obtained in each order of the loop expansion for all processes. The electric and magnetic charges are not constrained with the Dirac condition and therefore perturbation theory can be made reliable. The renormalized theory is found to possess exact dual invariance. Comparisons with the general QEMD of electric and magnetic charges are made.

11097 **(IC—82/57) Towards an effective bilocal theory from QCD in a background.** Magpantay, J.A. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 26p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704448.

Using the path integral, we show how we can get background gauge invariant bilocals (to be identified with mesons) from QCD in a nontrivial ground state. We discuss in this paper mainly the formal manipulations, especially how to deal with the zero modes. We also discuss the large N limit of QCD in a background.

11098 **(IC—82/58) Stability domain of stationary solitons in a many-charge field model with non-Abelian internal symmetry.** Chakrabarti, S. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704449.

Stability, in the Lyapunov sense, of solitons of Synge's model extended to non-Abelian symmetry SU(2)xU(1) is considered. It is shown that the stability domain is determined by the inequalities $\Sigma sub(i,k=1)^2(delta\ Qsub(i)sup((0))/delta\ \omega sub(k)).\omega sub(i)\omega sub(k)<0$ and $\omega_1\omega_2>0$. The first condition is a necessary one for stability domain of a soliton solution in any time-reversible many-charge model with second-order time derivatives.

11099 **(IC—82/97) Avoiding domain wall problem in SU(N) grand unified theories.** Fujimoto, Y.; Zhiyong, Z. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 12p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704491.

We look for the possibility of embedding the discrete subgroup of U(1)-Pecci-Quinn symmetry into the continuous one to avoid the domain wall problem. We find, within some restricted context, among various SU(N) models only one-family SU(5) and SU(6).

11100 **(IC—82/101) Precocious unification in simple GUTS.** Ozer, M. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 14p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704479.

We investigate how simple Grand Unified Theories (GUTS) with precocious unification mass can be constructed. The maximal local symmetry of 2mn left-handed fermions and their left-handed antiparticles is shown to be a viable candidate, where m and n are the number of families and colours respectively. The predictions of such a model are studied.

11101 **(IC—82/113) Class of simple solutions of the SU(2) Yang-Mills equations.** Raczka, P. Jr. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704433.

We investigate the solutions of SU(2) Yang-Mills equations of the form $Asub(\mu)(x)=Asub(\mu)(R)$, $R=lambda\nu xsup(\nu)$, $lambda\nu=$constant four-vector. We prove, that for null lambda only embedded maxwellian solutions exist. For spacelike and timelike lambda we reduce the problem to the solution of the system of two ordinary differential equations for two unknown functions. Some explicit solutions are given.

11102 **(IC—82/140) No domain wall problem in SU(N) grand unified theory.** Fujimoto, Y.; Shigemoto, K.; Zhiyong, Z. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704435.

It is shown that a wide class of SU(n) x U(1)sub(P.Q.) Grand Unified Theories can avoid the domain wall problem.

11103 **(IC—82/142) Trivial solution to the domain wall problem.** Christos, G.A. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 5p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704436.

Short communication.

11104 **(IC—82/175) Fermion mass ratios and low energy grand unification.** Ozer, M. (International Centre for Theoretical Physics, Trieste (Italy)). Aug 1982. 7p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704482.

Within the framework of the "naturalness" hypothesis for the Yukawa couplings, fermion mass ratios are shown to require the energy scale for grand unification and the energy scale for SU(4)sub(colour) breaking to be greater than 10^9 - 10^{10} GeV. Hence very low energy unification and neutron-antineutron oscillations in grand unified theories are incompatible with the "naturalness" of the Yukawa couplings and the masses of the Higgs scalars.

11105 **(IC—82/177) Low mass-scale parity restoration in expanded gauge theories.** Rajpoot, S. (International Centre for Theoretical Physics, Trieste (Italy)). Jul 1982. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704483.

It is shown that schemes of grand unification with $SU(2n)^4$ gauge symmetry permit the embedding of the left-right symmetric SU(2)sub(L)xSU(2)sub(R)xU(1)xSU(3) intermediate symmetry at relatively low energies (between 250 GeV and 1 TeV) as well as allowing light unification mass-scales ($<=10^5$ TeV) if $n>=3$ for values of the weak angle $Sin^2thetasub(W)$ and the strong coupling $\alpha sub(s)$ in the ranges $0.20<=Sin^2thetasub(W)<=0.25$, $0.10<=\alpha sub(s)<=0.15$.

11106 **(IC—82/199) Uniqueness of the SU(2) instanton.** Randjbar-Daemi, S. (International Centre for Theoretical Physics, Trieste (Italy)). Oct 1982. 8p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704437.

We present a simple geometric technique to find the SO(5) invariant solutions of the SU(2) gauge field equation on S^4. These solutions have non-vanishing second Chern classes with opposite signs. We prove that they are unique and that their uniqueness follows from their SO(5) invariance.

11107 **(IC—82/233) Superconformal current multiplet.** Smailagic, A. (International Centre for Theoretical Physics, Trieste (Italy)). Dec 1982. 11p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704442.

We consider a derivation of a superconformal current multiplet based directly on superconformal algebra. This gives usual multiplet of currents without anomalies, directly in terms of "improved" quantities and without reference to a particular Lagrangian model.

11108 (JINR—D-1,2-81-728, pp 27-37) **Functional approaches to two-dimensional QCD.** Ebert, D. (Akademie der Wissenschaften der DDR, Berlin-Zeuthen. Inst. fuer Hochenergiephysik). 1981. NTIS (US Sales Only), PC A16/MF A01. (CONF-8109144—).

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics; Dubna, USSR (15 Sep 1981).

Different functional approaches to QCD_2 are reviewed and a comparison of their results is made. In particular it has been noticed that seemingly quite different techniques lead to quite similar results. The only exception here is the bosonization formalism which is essentially a strong coupling approach. An important question is, of course, how and to which extent one can solve the analogous dynamical equations for QCD in 1+3 space-time. In the latter theory the transverse gluonic degrees of freedom may well form new gluonic collective excitations absent in QCD_2. Furthermore, they are expected to play an important role for the confinement mechanism and the properties of the vacuum.

11109 (JINR-D—1,2-81-728, pp 21-26) **Topological excitations and Monte-Carlo simulation of the Abelian-Higgs model.** Ranft, J. (Karl-Marx-Universitaet, Leipzig (German Democratic Republic)). 1981. NTIS (US Sales Only), PC A16/MF A01. (CONF-8109144—).

From 6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics; Dubna, USSR (15 Sep 1981).

The phase structure and topological excitations, in particular the magnetic monopole current density, are investigated in a Monte-Carlo simulation of the lattice version of the four-dimensional Abelian-Higgs model. The monopole current density is found to be large in the confinement phase and rapidly decreasing in the Coulomb and Higgs phases. This result supports the view that confinement is neglected with the condensation of monopole-antimonopole pairs.

11110 **(KFKI—1983-39) Schwinger model in temporal gauge.** Balog, J.; Hrasko, P. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Apr 1983. 22p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704452.

Exact solution of the zero-mass Schwinger model is given in temporal gauge in the presence of arbitrary background charge density. The structure of the Hilbert space is found to be considerably simpler than in Landau gauge. Unitarily implementable c-number gauge transformations are compared with the corresponding transformations in the Landau gauge. The operator solution is extended to the many-flavour model and a procedure is suggested for the construction of the physical Hilbert space.

11111 **Consistent formulation of fermions on a Minkowski lattice p.** Bender, C.M.; Milton, K.A.; Sharp, D.H. (Department of Physics, Washington University, St. Louis, Missouri 63130). *Physical Review Letters;* **51**: No. 20, 1815-1818(14 Nov 1983).

The finite-element approach described in a previous paper approximates the operator Dirac equation on a lattice in such a way that the equal-time anticommutation relations are exactly maintained. Moreover, the approximation preserves unitarity (and chiral invariance in the massless theory) and there is no fermion doubling.

11112 **Mass inequalities for quantum chromodynamics.** Weingarten, D. (Department of Physics, Brown University, Providence, Rhode Island 02912; and IBM Thomas J. Watson Research Center, Yorktown Heights, New York 10598). *Physical Review Letters;* **51**: No. 20, 1830-1833(14 Nov 1983).

For n-flavor lattice QCD rigorous lower bounds are derived on the masses of baryons, for even n> or =6, and on the masses of flavor-nonsinglet mesons, for even n> or =2. The lower bounds are proportional to the pion mass. The consequence of these inequalities for chiral-symmetry breaking is considered.

6455 Scattering Theory

11113 **(JINR—E-5-82-669) Asymptotic behaviour of the scattering phase for non-trapping metrics.** Popov, G.S. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation). 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704451.

The asymptotic behaviour of the scattering phase is considered at infinity for an elliptic, self-adjoint, second order differential operator H, defined either in Rsup(n) or in an unbounded domain Ω contains Rsup(n) with Dirichlet or Neumann boundary conditions. The operator H has the form H=- Δsub(g)+hD+V where Δsub(g) is the Laplace-Beltrami operator related to a Riemann metric g in anti Ω. Provided a non-trapping hypothesis is fulfilled and H coincides with the Laplace operator Δ in a neighbourhood of infinity, an asymptotic development of the scattering phase s(lambda) is obtained for lambda → infinity. The first coefficients in this development are found.

11114 **Unified geometrical approach to relativistic particle dynamics.** Balachandran, A.P.; Marmo, G.; Mukunda, N.; Nilsson, J.S.; Simoni, A.; Sudarshan, E.C.G.; Zaccaria, F. (Center for Particle Theory and Department of Physics, The University of Texas at Austin, Austin, Texas 78712). *Journal of Mathematical Physics (New York);* **25**: No. 1, 167-176(Jan 1984). Contract AC02-76ER03533.

Models for systems of relativistic particle dynamics are reviewed in terms of a geometrical setting for constraint dynamics. They are derived from the same grand abstract space by means of a common reduction procedure and are put in correspondence with invariant subgroups of the Poincare group. A new model corresponding to the identity subgroup is also discussed.

65 PHYSICS. II.

REFER ALSO TO CITATION(S) 10000

6510 Nuclear Physics

REFER ALSO TO CITATION(S) 10001

11115 **Data base and related services in basic and applied nuclear physics.** Tuli, J.K. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **44**: 191(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11116 **Recent references.** Ramavataram, S. (Brookhaven National Laboratory, Upton, New York 11973). *Nuclear Data Sheets;* **38**: No. 3, 349-350(Mar 1983). Contract AC02-76CH00016.

An indexed bibliography is published to all literature received by the National Nuclear Data Center or assigned key numbers between May and August 1983.(AIP)

6511 Experimental Techniques

REFER ALSO TO CITATION(S) 10574

6512 Nuclear Properties And Reactions, A=1-5, Theoretical

11117 **(CEA-CONF—6769) Pion photo- and electroproduction on light nuclei.** Laget, J.M. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). May 1983. 26p. (CONF-830588—5). NTIS (US Sales Only), PC A03/MF A01. Order Number DE84750330.

From Delta-Nucleus dynamics symposium; Argonne, IL, USA (2 May 1983).

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The mechanisms which govern the absorption of a virtual or real photon by a nucleus at intermediate energy are presented. The method of analysis is based on the non relativistic reduction of a few relevant diagrams. Comparison of it to more conventional approaches, and estimation of its limits are shown. It is particularly well suited to the study of the few body systems.

6513 Nuclear Properties And Reactions, A=6-19 Theoretical

11118 **(JAERI-M—83-221) Evaluation of neutron nuclear data for ^{12}C.** Shibata, K. (Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment). Dec 1983. 72p. (NEANDC(J)—95/U; INDC(JAP)—82/L). Japan Atomic Energy Research Inst., Tokai-mura, Nakagun, Ibaraki-ken 319-11.

Neutron nuclear data of ^{12}C have been evaluated for JENDL-3 in the energy range from 10^{-5} eV to 20 MeV. Evaluated quantities are the total, elastic and inelastic scattering, radiative capture, photonproduction, (n,p), (n,d) and (n,α) reaction cross sections and the angular or energy distribution of neutrons and photons. The total cross section below the threshold energy of the inelastic scattering has been calculated on the basis of the R-matrix theory. Three discrete levels have been taken into account for the inelastic scattering. 63 references.

11119 **Spin alignment and phase angles in ^{12}C+ ^{12}C inelastic scattering.** Willett, S.J.; Korotky, S.K.; Phillips, R.L.; Bromley, D.A.; Erb, K.A. (Wright Nuclear Structure Laboratory, Yale University, New Haven, Connecticut 06511). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 1986-2000(Nov 1983).

The spin alignment A and the relative phase angle β between the m = +2 and -2 substates populated in ^{12}C+ ^{12}C(2$_1^+$) inelastic scattering were measured over a wide range of particle scattering angles ($53^\circ < \theta$/sub c.m./$< 101^\circ$) and interaction energies (15<E/sub c.m./<33 MeV). Although the substate population parameters depend rather strongly on reaction angle, the angle-averaged alignment is markedly enhanced at energies where either broad or narrow maxima occur in σ(E), at least below E/sub c.m./ = 26 MeV. Above that energy variations in the alignment become damped with respect to both bombarding energy and reaction angle. The relative phase $\beta(\theta)$ is approximately linear in θ at most energies. For energies below E/sub c.m./ = 26 MeV corresponding to gross structure maxima in the inelastic cross sections, the measured dependence of the phase on reaction angle suggests that the reaction is dominated at these energies by individual entrance and exit channel partial waves L and L′, respectively, and that these are related by L′ = L-2. Thus a strongly aligned configuration can be associated with the maxima. At neighboring energies no evidence for such alignment was found. Calculations with the band-crossing, diffraction, distorted-wave Born approximation, and barrier-top models were compared to the measurements. None provide an adequate representation of the data.

11120 **Isospin effects in πip12C, ^{13}C, and ^{14}C at 65 and 80 MeV.** Blecher, M.; Gotow, K.; Burman, R.L.; Hynes, M.V.; Leitch, M.J.; Chant, N.S.; Rees, L.; Roos, P.G.; Bertrand, F.E.; Gross, E.E. (Virginia Polytechnic Institute and State University, Blacksburg, Virginia 24061). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 2033-2041(Nov 1983).

Elastic scattering cross sections for π^{+-} scattering from ^{12}C, ^{13}C, and ^{14}C are presented for pion energies of 65 and 80 MeV and for scattering angles from 20° to 120°. Energy dependent isospin effects are observed. The cross sections were fit with the Kisslinger potential, and the potential strength parameters show an (N-Z)/A dependence similar to that predicted by the impulse approximation at 65 MeV, but not at 80 MeV. Calculations using the Siciliano potential, which contains the explicit isospin dependence of the Lorentz-Lorenz-Ericson-Ericson effect plus isoscalar, isovector, and isotensor terms, indicate the importance and energy dependence of absorption effects. Finally a "model independent" parametrization of the neutron density suggests a neutron excess at the surface of ^{13}C but not ^{14}C.

6514 Nuclear Properties And Reactions, A=20-38, Theoretical

11121 **Observation of anomalously short mean free paths of projectile fragments of 1.85A-GeV ^{40}Ar in CR-39 etched track detector.** Tincknell, M.L.; Price, P.B.; Perlmutter, S. (Space Sciences Laboratory, Department of Physics, University of California, Berkeley, California 94720). *Physical Review Letters;* **51**: No. 21, 1948-1951(21 Nov 1983). Contract AC03-76SF00098.

When fragments of 1.85A-GeV ^{40}Ar projectiles are observed in a CR-39 etched track detector, anomalously short mean free paths of secondary nuclei with 11> or =Z> or =17 are found within the first 2 cm after their production, at ~3 standard deviations. This confirms the previous reports of this "anomalon" effect in nuclear emulsion. The data can be fitted by the hypothesis that ~3.6% of the secondaries have a mean free path of ~1.0 cm and infinite lifetime.

6515 Nuclear Properties And Reactions, A=39-58, Theoretical

11122 **(CEA-CONF—6720) Research on giant resonances at high excitation energy by alpha particle inelastic scattering.** Bonin, B.; Alamanos, N.; Arvieux, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 15p. (In French). (CONF-830471—2). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750301.

From Saturne study meeting; Maine-et-Loire, France (25 Apr 1983).

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Inelastic cross sections of 340-480 MeV alpha particles on ^{208}Pb, ^{116}Sn and ^{58}Ni targets have been measured up to 60 MeV excitation energy in a large angular range. The experimental data have been analyzed by a new method. The response function provides informations on electric giant resonances and exhibits the presence of new concentrations of multipolar force of very high excitation energy.

11123 **(CEA-N—2337) Study of giant resonances at high excitation energy by alpha inelastic scattering.** Bonin, B. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 169p. (In French). NTIS (US Sales Only), PC A08/MF A01. Order Number DE84750306.

Angular distributions of 340 and 480 MeV alpha particles inelastically scattered by ^{208}Pb, ^{116}Sn and ^{58}Ni up to 60 MeV of excitation have been measured. The experimental inelastic spectra have been analysed by means of a new global method. The repartition of multipole strength shows the already known low energy giant resonances into more details. New high energy giant resonances are observed.

11124 **(PB—83-253781) Folding model analysis of alpha-particle elastic scattering with a semirealistic density dependent effective interaction.** Kobos, A.M.; Brown, B.A.; Hodgson, P.E.; Satchler, G.R.; Budzanowski, A. (Oxford Univ. (UK). Nuclear Physics Lab.). 1982. 27p. NTIS, PC AE04/MF E04.

The aim of this study was to examine the density dependent effective interaction, DDEI, applied in the double-folding model and to investigate whether folding model analyses of alpha particle elastic scattering could be used to calculate nuclear matter densities. Accordingly, differential cross-sections for the elastic scattering of alpha particles from (40)Ca, (46,48,50)Ti, (58)Ni, (90)Zr and (208)Pb at 140 MeV and from (58,60,62,64)Ni at 172 MeV were analyzed using the model with a semirealistic DDEI based on the M3Y interaction for the real potential and various phenomenological imaginary potentials. Good fits with consistent parameters of the model were obtained. The application of folding model analyses of alpha particle elastic scattering to the determination of nuclear matter density distribution was critically examined.

11125 **Observation of rigid nuclear rotation.** Price, H.G.; Lister, C.J.; Varley, B.J.; Gelletly, W.; Olness, J.W. (Daresbury Laboratory, Warrington WA44AD, United Kingdom). *Physical Review Letters;* **51**: No. 20, 1842-1845(14 Nov 1983). Contract AC02-76CH00016.

States in ^{84}Zr with angular momenta up to 34h and rotational frequency 1.3 MeV have been studied with the techniques of discrete-line gamma-ray spectroscopy. The measurements probe the region beyond a second upbend. In this region the results are consistent with the nucleus having undergone a transition to an axially symmetric shape with $\beta = 0.43 +- 0.06$ and $\gamma = 3° +- 6°$ which rotates with the rigid-body moment of inertia.

11126 **Beta decay of ^{75}Rb to low-lying levels in ^{75}Kr.** Kern, B.D.; Toth, K.S.; Moltz, D.M.; Lin, J.; Avignone, F.T. III; Noma, H.; Leander, G.A. (University of Kentucky, Lexington, Kentucky 40506). *Physical Review [Section] C: Nuclear Physics;* **28**: No. 5, 2168-2170(Nov 1983).

The isotope ^{75}Rb was produced via the ^{58}Ni(^{20}Ne,p2n) reaction and mass separated with an on-line isotope separator. Its half-life was determined to be 21.4 +- 1.0 sec. Twenty-one γ rays were placed in a partial decay scheme with levels in ^{75}Kr up to 1042.4 keV in excitation. The data are consistent with the existence of previously proposed $(5/2)^+$ ground-state and $(3/2)^-$ first-excited-state rotational bands in ^{75}Kr, and with a $(3/2)^-$ or $(5/2)^-$ assignment for the ground state of ^{75}Rb.

11127 **Analog giant resonance excitation via the (n,p) reactions.** Brady, F.P. (University of California, Davis, CA 95616). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1250-1254(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The direct (n,p) reaction is a selective tool for studying isovector transitions which are induced by an isovector interaction and in which there is a transfer of one unit of isospin to the target. Furthermore the (n,p) selection rule $\Delta T_3 = \Delta T = +1$ implies that only T=T /SUB o/ (tgt) + 1 states (the analogs of T /SUB o/ + 1 states of the target) are excited. The authors' measurements of (n,p) spectra on selected targets ranging from ^{4}He to ^{209}Bi reveal that the excitations of the analogs of giant resonance states particularly the "E1" GDR and "M1" are strong for light nuclei. Essentially 100% of the GDR sum rule, as given by the Goldhaber-Teller (GT) model, is exhausted. For M1 transitions the use of matrix elements from B-decay allows the central S=1 part of the isovector interaction to be determined. A larger-than-expected N-Z dependence is found for the Ni(n,p) cross sections of the even Ni isotopes. For heavy nuclei the filling of neutron ahead of proton orbitals produces the expected blocking of (n,p) to the analog GDR excitations, and low-lying resonances in ^{209}Bi(n,p) appear to be isovector E2 analogs.

6516 Nuclear Properties And Reactions, A=59-89, Theoretical

11128 **(CEA-CONF—6682) Several applications of the DWBA diffractional model of quasi-elastic reactions induced by heavy ions.** Mermaz, M.C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Mar 1983. 21p. (CONF-830384—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750305.

From International symposium on nuclear physics at large tandem accelerators; Legnaro-Padova, Italy (15 Mar 1983).

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Several applications of a DWBA formula due to Blair-Austern and Hahne and based on the diffractional model are presented. This formula can be considered as an excellent analytical fit of the ERF-DWBA model. The spectroscopical strength is lost by this strong simplification. The dynamics of the reaction: Q and L matching are properly treated. The first application is the straightforward computation of the direct transfer cross section induced by heavy ions for discrete levels populated by a one-step process. The second application is a Regge-pole analysis of alpha transfer reaction for a zero spin system; cross section had been measured between zero and 180° center-of-mass angles, the third application is the analysis of elastic scattering with backward transfer of particles between two identical colliding cores. In these two last cases the general DWBA formula of Blair-Austern-Hahne is heavily and naturally simplified due to the fact we are dealing with zero spin system and in addition for the third case with reaction Q-value strictly equal to zero. Finally the fourth application is the computation of the double differential cross section dsigma/domegadEf of the continuum states.

11129 **Decay of ^{77}Sr and level structure of ^{77}Rb.** Lister, C.J.; Varley, B.J.; Alburger, D.E.; Haustein, P.E.; Saha, S.K.; Olness, J.W.; Price, H.G.; Irving, A.D. (Department of Physics, Schuster Laboratory, University of Manchester, Manchester M139PL, United Kingdom). *Physical Review [Section] C: Nuclear Physics;* **28**: No. 5, 2127-2135(Nov 1983).

An oil vapor helium-jet transfer system was used to study the β^+ decay of ^{77}Sr produced in the ^{40}Ca(^{40}Ca,2pn)^{77}Sr reaction at 110—130 MeV. Singles and coincidence measurements established the decay to four levels in ^{77}Rb and allowed measurements of T/sub 1/2/ = 9.0 +- 0.2 sec for the decay half-life and Q/sub EC/ = 6986 +- 227 keV for the total decay energy. In-beam studies of the p ^{40}Ca(^{40}Ca,3pγ) ^{77}Rb reaction were made at 117 MeV. Two distinct bands were observed in ^{77}Rb and probable spin and parity assignments were made. These data favor J/sup π/ = $(5/2)^+$ for the ^{77}Sr ground state. The ^{77}Rb bands are compared to neighboring odd-A nuclei and to recent calculations.

11130 **Nuclear structure studies in the medium mass (A $\approx$70) region.** Ramayya, A.V. (Vanderbilt University, Nashville, TN 37235). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1273-1278(Apr 1981). (CONF-801111—). Contract AS05-76ER05034.

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The in-beam Y-ray studies on several nuclei in A $\approx$ 70 region, have revealed highly collective band structures of the following types: ground state band, one or two even spin positive parity bands with 8^+ as band head, odd and even spin negative parity bands, $\Delta J = 1$ even parity bands with 2^+ as band heads, and deformed bands built on the first excited 0^+ states. Not all these types of bands have been observed in all of the nuclei in this mass region. The even spin positive parity bands with 8^+ as band head and the negative parity bands can be understood in terms of rotational alignment model. The Interacting Boson Model calculations reproduce the negative parity bands and the $\Delta J = 1$ even parity bands with 2^+ as band head. Both these models have to be further investigated as to the validity of them in describing nuclei in the mass region A $\approx$ 70. Recent dynamic deformation model calculations of Kumar support the shape coexistence picture for ^{72}Se, which explains the deformed bands built on the first excited 0^+ states.

6517 Nuclear Properties And Reactions, A=90-149, Theoretical

11131 **Shell effects at high angular momentum.** Deleplanque, M.A.; Macchiavelli, A.O.; Diamond, R.M.; Stephens, F.S.; Dines, E.L.; Draper, J.E. (Nuclear Science Division, Lawrence Berkeley Laboratory, University of California, Berkeley, California 94720). *Physical Review Letters;* **51**: No. 20, 1854-1857(14 Nov 1983). Contract AC03-76SF00098.

Major-shell effects are seen in the unresolved γ-ray spectra coming from high-spin states in the transition region: ^{164}Er to ^{160}Er. The angular momentum alignments in the valence shell, which are spread in frequency in the heavier nuclei, are compressed into the low-frequency region in the lighter nuclei and separate almost completely from the angular momentum contributions due to the next higher major (proton) shell.

11132 **Suppression of neutron emission after heavy-ion fusion: Is shape relaxation affected by a superdeformed minimum?.** Kuehn, W.; Chowdhury, P.; Janssens, R.V.F.; Khoo, T.L.; Haas, F.; Kasagi, J.; Ronningen, R.M. (Argonne National Laboratory, Argonne, Illinois 60439). *Physical Review Letters;* **51**: No. 20, 1858-1861(14 Nov 1983). Contract W-31-109-ENG-38.

Neutron spectra as a function of spin and the neutron multiplicity distribution have been measured for the reaction 233-MeV ^{64}Ni+ ^{96}Zr. The emission of two neutrons constitutes the strongest decay channel, in contrast to statistical-model calculations which predict the emission of three neutrons to be the strongest by more than one order of magnitude. This is possibly due to trapping in a superdeformed potential well, similar to that giving rise to fission isomers, as the compound nucleus relaxes from the highly distorted initial shape.

11133 **Decay of ^{143}Ba to levels of odd-odd ^{142}La.** Chung, C.; Walters, W.B.; Brenner, D.S.; Aprahamian, A.; Gill, R.L.; Shmid, M.; Chrien, R.E.; Yuan, L.; Wolf, A.; Berant, Z. (Department of Chemistry, University of Maryland, College Park, Maryland 20742). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 2099-2114(Nov 1983).

The γ- ar:l β-ray radiation following the decay of ^{142}Ba to ^{142}La were measured in experiments in which β end-point energies, $\beta\gamma$ coincidences, γ-ray singles, $\gamma\gamma t$ coincidence, and $\gamma\gamma t(\theta)$ angular correlation data were collected. The ^{142}Ba activity was produced by on-line mass separation from the ^{238}U(n/sub th/,f) reaction. A level scheme for odd-odd ^{142}La was deduced from coincidence information that includes 90 γ rays which are placed among 23 levels. A 0.87 +- 0.17 μs isomeric state was established at 145 keV. The Q/sub β/ value of 2200 +- 25 keV was determined from β-γ coincidence data. Beta-ray intensities and logft values have been evaluated, and along with internal conversion and angular correlation measurements, yielded spin-parity assignments for a number of levels. The low-lying levels were compared with level schemes projected from $\pi\nu$ multiplet parabolas computed using parameters extracted from parabolic fits in ^{140}La and ^{142}Pr.

6518 Nuclear Properties And Reactions, A=150-189, Theoretical

11134 **Charge exchange (p,n) reactions to the isobaric analog states of high Z nuclei: 73< or =Z< or =92.** Hansen, L.F.; Grimes, S.M.; Poppe, C.H.; Wong, C. (University of California, Lawrence Livermore National Laboratory, Livermore, California 94550). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 1934-1946(Nov 1983). Contract W-7405-ENG-48.

Differential cross sections have been measured for the (p,n) reaction to the isobaric analog states of ^{181}Ta, ^{197}Au, ^{209}Bi, ^{232}Th, and ^{238}U at an incident energy of 27 MeV. Because of the importance of collective effects in this mass region, coupled-channel calculations have been carried out in the analysis of the data. Optical potentials obtained from the Lane model for the charge exchange reaction have been used in the simultaneous analysis of coupled proton and neutron channels. The sensitivity of the calculations to the different couplings between the levels and to the magnitude of the isovector potentials, V_1 and W_1, is discussed. The good agreement obtained between the measured and calculated (p,n) angular distributions to the analog state confirms the validity of the Lane formalism for high-Z nuclei (Z> or =30). Elastic neutron differential cross sections inferred from the coupled-channel analysis are compared with measurements available in the literature in the energy range 7—8 MeV. The results of these calculations agree with the measured values as well as the results of calculations made using global neutron optical potential parameters optimized to fit neutron data.

11135 **Pion elastic and inelastic scattering from ^{152}Sm.** Morris, C.L.; Seestrom-Morris, S.J.; Seidl, P.A.; Kiziah, R.R.; Greene, S.J. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 2165-2167(Nov 1983).

Cross sections for pion elastic and inelastic scattering to the ground state and the 0.122 MeV 2^+ state of ^{152}Sm are presented. Coupled channel and distorted-wave impulse approximation analysis of the data indicate that the neutron quadrupole deformation parameter β_2 is nearly equal to the proton quadrupole deformation parameter β_2(p).

11136 **Fission of polonium, osmium, and erbium composite systems.** van der Plicht, J.; Britt, H.C.; Fowler, M.M.; Fraenkel, Z.; Gavron, A.; Wilhelmy, J.B.; Plasil, F.; Awes, T.C.; Young, G.R. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Physical Review* [*Section*] *C: Nuclear Physics;* **28**: No. 5, 2022-2032(Nov 1983).

Fission cross section excitation functions were measured from near threshold to ~10 MeV/nucleon using ^{9}Be, ^{12}C, /sup 16,18/O, /sup 24,26/Mg, ^{32}S, and ^{64}Ni beams. The systems studied included ^{210}Po formed in ^{12}C and ^{18}O induced reactions; ^{186}Os formed in ^{9}Be, ^{12}C, ^{16}O, and ^{26}Mg reactions; and ^{158}Er formed in ^{16}O, ^{24}Mg, ^{32}S, and ^{64}Ni reactions. In addition, the composite systems /sup 204,206,208/Po formed with ^{16}O and ^{18}O projectiles were studied. In the experiment the velocities and emission angles of two coincident fission fragments were measured using position-sensitive p multiwire proportional counter stop detectors and a thin (~200 μg/cm^2) gas "start" detector. The measured fission excitation functions along with previous data from ^{4}He and ^{11}B bombardments for the ^{186}Os and ^{210}Po systems and recent data on the ^{200}Pb system are compared to statistical model calculations using recent angular momentum dependent fission barriers calculated by Sierk. Comparisons of calculated and measured fission excitation functions show good overall agreement between data and theoretical predictions. These comparisons give good agreement for both a wide range of mass of the composite system and for a wide range of mass asymmetry in the entrance channel. It is concluded that the fission barriers of Sierk give a good description of both the mass and angular momentum dependence of fission barriers in this region.

6519 Nuclear Properties And Reactions, A=190-219, Theoretical

11137 **(CEA-CONF—6721) Complete and incomplete fusion in transition energy range.** Harar, S. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 11p. (In French). (CONF-830471—3). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750302.

From Saturne study meeting; Maine-et-Loire, France (25 Apr 1983).

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Some experiments investigating different interaction conditions (complete or incomplete fusion, hot points, deep inelastic collisions) in the transition energy range (20 MeV/A at 200 MeV/A) are exposed.

11138 **Formation and decay of a localized region of high excitation in heavy-ion—induced reactions.** Lynch, W.G.; Chitwood, C.B.; Tsang, M.B.; Fields, D.J.; Klesch, D.R.; Gelbke, C.K.; Young, G.R.; Awes, T.C.; Ferguson, R.L.; Obenshain, F.E. (National Superconducting Cyclotron Laboratory, Michigan State University, East Lansing, Michigan 48824). *Physical Review Letters;* **51**: No. 20, 1850-1853(14 Nov 1983). Contract W-7405-ENG-26.

Proton-proton correlations were measured in ^{16}O-induced reactions on ^{197}Au at 400 MeV. Measurements at both small and large proton relative momenta indicate that a significant fraction of the correlated protons are emitted from a spatially localized region of high excitation.

6520 Nuclear Properties And Reactions, A=220 And Above, Theoretical

11139 (UCID—19973) Reevaluation of ENDL of σ(n,f) and anti nu/sub p/ for ^{235}U and ^{239}Pu from 100 keV to 20 MeV. Howerton, R.J.; White, R.M. (Lawrence Livermore National Lab., CA (USA)). Jan 1984. Contract W-7405-ENG-48. 37p. NTIS, PC A03/MF A01. Order Number DE84005222.

Reevaluations of the neutron-induced fission cross sections from 100 keV to 20 MeV and anti nu/sub p/(E) from 0 to 20 MeV for ^{235}U and ^{239}Pu have been completed and entered into the Livermore Evaluated Nuclear Data Library (ENDL). For ^{235}U(n,f) the recent evaluation of W.P. Poenitz of Argonne National Laboratory has been adopted as the ^{235}U(n,f) ENDL standard. For ^{239}Pu(n,f) the ^{239}Pu/^{235}U fission cross section ratio measurement of Carlson and Behrens of LLNL, which has served as the basis for the ^{239}Pu(n,f) ENDL evaluation to the present, is compared with several new ratio measurements for the new evaluation. For anti nu/sub p/(E) ratio values of Soleihac, et al. were renormalized to the currently accepted value of ^{252}Cf anti nu/sub sf/ and used as the basis for the present ENDL evaluation. Experimental anti nu/sub p/(E) values measured by Gwin, et al. in 1978 from 0.5 keV to 10 MeV are reasonably consistent with the values of Soleihac, et al. Results of criticality calculations using the new evaluated cross sections and anti nu/sub p/(E) are compared for various critical mass assemblies. Also, Monte Carlo calculations using these new evaluations are compared with experimental data from the LLNL 14-MeV pulsed sphere measurements.

6530 Nuclear Theory

11140 (CEA-CONF—6690) El strength function at high spin and excitation energy. Barrette, J. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 17p. (CONF-830469—10). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750303.

From Nuclear physics with heavy ions conference; Stony Brook, NY, USA (14 Apr 1983).

Portions are illegible in microfiche products.

Recently giant dipole resonance-like concentration of the dipole strength function in nuclei was observed at both high excitation energies and high spins. This observation raises the possibility of obtaining new information on the shape of rapidly rotating heated nuclei. Recent experimental results on this subject are reviewed.

11141 (CEA-CONF—6700) Fast fission phenomena. Ngo, C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Apr 1983. 12p. (CONF-830444—5). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750304.

From International school-seminar on heavy ion physics; Alushta, USSR (14 Apr 1983).

Portions are illegible in microfiche products.

We review the conditions under which two heavy ions can fuse together. Then we discuss fast fission mechanism which is an intermediate mechanism between inelastic and compound nucleus reactions.

11142 (ISN—82-42) Bifurcations and chaos of classical trajectories in a deformed nuclear potential. Carbonell, J.; Arvieu, R. (Grenoble-1 Univ., 38 (France). Inst. des Sciences Nucleaires). Oct 1982. 7p. (CONF-821065—4). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750297.

From Topical meeting on nuclear fluid dynamics ICTP; Trieste, Italy (11 Oct 1982).

Portions are illegible in microfiche products.

The purpose is to describe the general organization of the trajectories of a nucleon in a deformed potential both in phase space and in configuration space. This question gives rise to a very complex problem in a deformed potential. There one is in the frame of the theory of nonintegrable systems. Many very important mathematical theorems (like K.A.M. theorem) are needed as well as any results of bifurcation theory and also of numerical experiments. This work belongs entirely to classical mechanics. The main problems to be treated are: the organization of phase space, the connection with simple known limiting cases and bifurcation theory, and the occurrence of chaotic trajectories in a nuclear field. These problems must be solved as functions of the size, the deformation of the potential and the excitation energy of the particle.

11143 (UCID—19966) Code ALICE B and B: a precompound/evaporation fission code emphasizing neutron yields. Blann, M.; Howe, R. (Lawrence Livermore National Lab., CA (USA)). Nov 1983. Contract W-7405-ENG-48. 29p. NTIS, PC A03/MF A01. Order Number DE84005224.

This report describes a version of the code ALICE/LIVERMORE 82 which has been modified to output neutron yield information of the type one would measure in an experiment gated by measuring a fission fragment. The modified code does the same precompound/compound decay calculations as the code ALICE/LIVERMORE 82, but has additional buffers and algorithms for the neutron yield calculation. We calculate the pre-fission neutron spectra and multiplicities, and post-fission neutron spectra and multiplicities, predicted for measurements which are gated on fission events. In this report we describe the additional output, referring the reader to the more complete report on the original code for further details.

11144 Clark et al. and McNeil et al. respond. Clark, B.C.; Hama, S.; McNeil, J.A.; Mercer, R.L.; Ray, L.; Hoffmann, G.W.; Serot, B.D.; Shepard, J.R.; Wallace, S.J. (Department of Physics, The Ohio State University, Columbus, Ohio 43210). *Physical Review Letters;* **51**: No. 19, 1808-1809(7 Nov 1983).

The differential cross sections and analyzing power are calculated for p+^{40}Ca and p+^{208}Pb elastic scattering with a tensor term included in the relativistic impulse approximation optical potential.(AIP)

11145 Possibility of observing recoilless resonant neutrino absorption. Kells, W.P.; Schiffer, J.P. (Fermi National Accelerator Laboratory, Batavia, Illinois 60510). *Physical Review [Section] C: Nuclear Physics;* **28**: No. 5, 2162-2164(Nov 1983). Contract W-31-109-ENG-38.

Low Q value weak nuclear decays are considered which have two-body final states (electron captures and bound-state beta decays). This opens the possibility for the observation of a process analogous to the Moessbauer effect, where the emitted (anti)neutrinos would be resonantly absorbed by atoms in a suitable absorber. Candidates for such a process are examined. Line widths as small as the narrowest observed in Moessbauer spectroscopy may conceivably allow a new class of ν (disappearance) oscillation experiments.

11146 Neutron scattering from spherical and shape transitional nuclei. Weil, J.L. (University of Kentucky, Lexington, Kentucky 40506). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1255-1259(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

In this review various types of information on reaction mechanisms, nuclear structure, and nuclear dynamics that can be deduced from the interaction of neutrons with nuclei are discussed. For the case of spherical nuclei, evidence concerning the neutron-excess dependence of the surface absorption of the optical potential will be presented, as well as some examples of how neutron scattering can be used as a quite sensitive spectroscopic tool. In the latter part of the paper some newly emerging possibilities for determining both the structure and the dynamics of shape transitional and deformed nuclei are discussed.

6540 Radiation And Shielding Physics

REFER ALSO TO CITATION(S) 10294, 10294, 10517

11147 (INIS-mf—8299, pp 44-53) **Nuclear solid state physics and technology.** Berthold, J.; Boehringer, K.; Damjantschitsch, H.; Demond, F.J.; Dollinger, T.; Frerichs, H.P.; Hirschel, W.; Kalbitzer, S.; Liu, H.X.; Mannsperger, H. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

Nuclear instruments and methods have been applied to solid state physics and technology problems.

11148 (UCID—19972) **Monte-Carlo calculations of forward directed bremsstrahlung produced by 20 and 45 MeV electrons on tungsten.** Goosman, D.R. (Lawrence Livermore National Lab., CA (USA)). 27 Dec 1983. Contract W-7405-ENG-48. 26p. NTIS, PC A03/MF A01. Order Number DE84005223.

The SANDYL Monte-Carlo code has been used to calculate the Bremsstrahlung photon production from beams of parallel electrons incident upon three target geometries. These are 20 MeV electrons onto 1 mm of tungsten + 59 mm of Be, which simulates the operating parameters of the FXR electron accelerator at LLNL Bldg. 801, 45 MeV electrons onto 1 mm of tungsten, and finally 45 MeV electrons onto 1 mm of tungsten and 147 mm of Be. The latter two situations simulate possible future modifications to the FXR accelerator. Graphs of the spectral shape of the Bremsstrahlung photons emitted with angles between 0^0 and 1^0 to the electron direction, the angular distribution of photon-MeV, and the dose reduction curves for each of the three geometries are given. The latter dose reduction curves allow one to calculate forward-directed photon fluxes in real-life situations where the electron beam has non-zero angular divergence.

11149 **Solution of multidimensional inverse transport problems.** Larsen, E.W. (University of California, Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of Mathematical Physics (New York);* **25**: No. 1, 131-135(Jan 1984).

Formulas are derived for energy-dependent, steady-state, and time-dependent neutron transport problems, relating the surface neutron fluxes for a convex, homogeneous, three-dimensional region to the neutron scattering laws that apply within the region. In principle, these formulas can be used to deduce information about the scattering laws.

11150 **Positronium formation and diffusion in a molecular solid studied with variable-energy positrons.** Eldrup, M.; Vehanen, A.; Schultz, P.J.; Lynn, K.G. (Brookhaven National Laboratory, Upton, New York 11973). *Physical Review Letters;* **51**: No. 21, 2007-2010(21 Nov 1983). Contract AC02-76CH00016.

Crystalline and amorphous ice were studied with monoenergetic positrons with incident energies $0<E<5$ keV. Positronium (Ps) forms in the ice and diffuses as a neutral particle until annihilation or escape from the surface. Measurement of the fraction of o-Ps leaving the surface reveals two distinct contributions to the total Ps-formation probability (both Ore- and spur-type) as well as the Ps diffusion coefficient, 0.17 +- 0.09 cm^2/sec in crystalline ice. In addition, positronium trapping is observed in sputtered (crystalline) ice and voids (> or $\approx$17 A diameter) in amorphous ice.

11151 **Environmental influences on K x-rays from highly stripped sulfur ions traveling in solids.** Watson, R.L.; Kenefick, R.A.; Langenberg, A.; White, J.R. (Cyclotron Institute, Texas A & M University, College Station, Texas 77843). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1036-1038(Apr 1981). (CONF-801111—). Contract AS05-78ER06036.

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

As a fast heavy-ion passes through a material medium, it undergoes multiple collisions in which electrons are continously lost and recaptured by the ion, and as a result, an equilibrium distribution of excited states is quickly established. The high density of electrons in a solid state environment enables these collisional excitation and decay processes to compete with x-ray and Auger decay. As a result, the widths of the x-ray lines exhibit a dependence on electron density due to collisional broadening. In addition, the potential of the ion is modified by the polarization of loosely bound electrons of the medium. In effect, these electrons act to screen the ion potential, thereby causing the core electron binding energies of the ion to decrease. As a result of this "dynamic screening" effect, the x-ray transition energies inside the medium differ from those in vacuum.

11152 **Characteristics and applications of channeling radiation from relativistic electrons and positrons.** Pantell, R.H.; Alguard, M.J.; Berman, B.L.; Bloom, S.D.; Datz, S.; Swent, R.L. (Stanford University, CA 94305). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1152-1155(Apr 1981). (CONF-801111—). Contract AM03-76SF00326.

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Relativistic electrons and positrons channeled in crystals radiate electromagnetic waves in relatively narrow spectral bands. The radiation is forward directed, linearly polarized, and occurs in picosecond bursts. Photons in the 20 to 130 keV range are emitted by 50 MeV particles, and the emission spectrum varies with the incident particle energy. Several applications of channeling radiation are considered: to study the properties of crystals in which channeling occurs, to investigate aspects of the channeling phenomenon, and as a source of x-rays.

6550 Medical Physics

REFER ALSO TO CITATION(S) 10489, 10576, 10616, 10890, 10911

11153 (CNEN-RT/PROT—81-28) **Optimization technique for radioprotection: methodology questions and applicative problems.** Frittelli, L.; Tamburrano, A. (Comitato Nazionale per l'Energia Nucleare, Sede (Italy). Direzione Centrale Sicurezza Nucleare e Protezione Sanitaria). Nov 1981. 46p. (In Italian). (CONF-8110279—1). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83900297.

From 67. national conference of the Italian Society of Physics; Pisa, Italy (3 Oct 1981).

The optimization techniques in radiation protection are briefly revised and discussed.

11154 (CONF-821215—, pp 291-300) **Standards for concentrations of radionuclides in soil: basis and implementation.** Brown, R.C.; Kephart, G.S. (Rockwell Hanford Operations, Richland, WA). Aug 1983. NTIS, PC A24/MF A01.

From 4. DOE environmental protection information meeting; Denver, CO, USA (7 Dec 1982).

Levels of acceptable concentrations for specified radionuclides in surface soil for release from a surface contamination status (soil standards) are in use by Rockwell Hanford Operations. They were developed for use in the two areas where the fuel and waste processing and waste management activities are located; these areas are referred to as the 200 Areas. (The soil standards, expressed as average activity per unit mass, are based on criteria to limit the total dose equivalent to acceptable levels.) The soil standards provide assurance that no one will receive more than 500 mR per year (continuous occupancy) from external gamma radiation and that uptake of radionuclides by ingestion of soil particulates, and drinking of surface contaminated water will be less than acceptable standards. These soil standards assume (1) US Department of Energy control of the areas and (2) that no food or forage crop production or grazing will be permitted. Implementation of the appropriate standards suggests a two tiered investigation approach. Three general categories of spatial contamination distribution are possible. An implementation guide has been proposed which would first identify which spatial distribution best characterizes the contamination of a given site. The spatial distribution of the first tier would then form the basis for statistical sampling/survey design

and compliance testing (the second tier). 10 references, 2 figures, 2 tables.

11155 **(IPNO—83-01) Neutron dose equivalent rates due to heavy ion beams.** Clapier, F.; Zaidins, C.S. (Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire). 1983. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750298.

We have used the existing neutron dose measurements from the bombardement of thick targets by heavy ion beams to study the relationship between the dose rate and the incident energy variable W, measured in units of MeV/nucleon. We find that the yield can be fit by a power law curve in term of W. The magnitude of the yield and the exponent in the power law depend upon the Z of the projectile. We offer a hypothesis for this behavior. This study has led to an empirical parametrization which permits one to predict the dose rate for a wide range of energies and ion types as a function of the distance from the target, and the angle relative to the beam axis.

11156 **(JINR—16-82-89) Analytic expression for some dosimetric characteristics of neutrons and protons.** Alejnikov, V.E.; Beskrovnaya, L.G. (Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of Radiation Safety). 1982. 6p. (In Russian). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704129.

Specific dose equivalents and admissible neutron and proton flux density available from national radiation safety guides (NRB-76), are approximated by the simplest formula. The approximation was performed in the energy range from thermal up to 10^6 MeV for neutrons and from 2 MeV up to 10^6 MeV for protons. The calculation results agree well with data presented in NRB-76.

11157 **Negative pion capture in biological material.** O'Leary, K. Guildford, England; Surrey University (1982). 163p. Available from British Library, Boston Spa, Wetherby, West Yorks. No. D44810/83.

A project was undertaken to measure the relative numbers of negative pions captured onto carbon, nitrogen and oxygen in a number of mostly organic compounds. The results have been used to investigate the validity of the Fermi Teller law. Dosimetry calculations, currently being used to plan pion radiotherapy treatment, are based on the predictions of this law. Results from this experiment show it to be incorrect for organic molecules. The results have also been used to guide the development of a previously existing molecular model of pion capture. A cascade calculation has been undertaken in order to gain further insight into the pionic capture and cascade processes and to determine whether or not certain processes, neglected for the purposes of the capture ratio calculation, were truly negligible.

11158 **A thermoluminescence dosimetry system for use in a survey of high-energy Bremsstrahlung dosimetry.** Soares, C.G.; Ehrlich, M. (National Bureau of Standards, Washington, DC). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1614-1620(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

A thermoluminescence dosimetry system suited for a survey of high-energy Bremsstrahlung in U. S. radiation-therapy departments has been selected and calibrated. The experiments leading to the choice of the recommended operational characteristics, including dosimeter handling, annealing and readout, dosimeter stability in the contemplated mode of operation, dosimeter response over the photon-energy range to be covered, irradiation geometry and irradiation level are treated in detail. Results are reported of a pilot study involving the shipment of a typical survey assembly (a plastic phantom loaded with a set of dosimeters) for irradiation in one U. S. therapy department and the overall uncertainty of the proposed survey procedure is discussed.

6560 Solid State Physics

REFER ALSO TO CITATION(S) 10001, 10990

11159 **(CEA-CONF—6795) Broken symmetry in the mean field theory of the ising spin glass: replica way and no replica way.** De Dominicis, C. (CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France)). Jun 1983. 23p. (CONF-8305153—1). NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750268.

From Colloquium on spin glasses; Heidelberg, F.R. Germany (30 May 1983).

We review the type of symmetry breaking involved in the solution discovered by Parisi and in the static derivation of the solution first introduced via dynamics by Sompolinsky. We turn to a formulation of the problem due to Thouless, Anderson and Palmer (TAP) that put a set of equations for the magnetization. A probability law for the magnetization is then built. We consider two cases: (i) a canonical distribution which is shown to give indentical results to the Hamiltonian formulation under a weak and physical assumption and (ii) a white distribution characterized by two matrices and a response. We show what symmetry breaking is necessary to recover Sompolinsky free energy. In section III we supplement replica indices in the Hamiltonian approach by "time" indices ans show in particular that the analytic continuation involved in Sompolinsky's equilibrium derivation, is trying to mimick a translational symmetry breaking in "time" that incorporates Sompolinsky's ansatz of a long time scale sequence. In section IV we apply the same treatment to the white average approach and show that, replicas can be altogether discorded and replaced by "time". Finally, we briefly discuss the attribution of distinct answers for the standard spin glass order parameter depending on the physical situation: equilibrium or non equilibrium associated with canonical or white (non canonical) initial conditions and density matrices.

11160 (INIS-SU—186, pp 25-26) **Characteristic properties of kinetic phenomena in semiconductors with damage regions.** Shpinar, L.I.; Yaskovets, I.I. (AN Ukrainskoj SSR, Kiev. Inst. Fiziki). 1982. (In Russian). NTIS (US Sales Only), PC A06/MF A01.

In Radiation damage physics and radiation technology.

Expressions for Hall and Nernst constants are derived for semiconductors containing damage regions created by irradiation with high energy particles. The Hall factor is shown to be determined both by the carrier scattering mechanism and by the degree of the crystal damage. The increase of the damage region concentration leads to the change of the sign of the Nernst constant even when the scattering mechanism is essentially the same. For a strong magnetic field, the Nernst constant is independent of it (in contrast to the case of homogeneous semiconductors) and is determined by the degree of material damage.

11161 **(LBL—16551) Elastic theory of the defect solid solution.** Morris, J.W. Jr.; Khatchaturyan, A.G.; Wen, S.H. (Lawrence Berkeley Lab., CA (USA); AN SSSR, Moscow. Inst. Kristallografii; IBM Research Div., Yorktown Heights, NY (USA)). Jun 1983. Contract AC03-76SF00098. 31p. (CONF-8306163—1). NTIS, PC A03/MF A01. Order Number DE84001976.

From NATO advanced study institute on modulated structure materials; Crete, Greece (15 Jun 1983).

This paper reviews the linear elastic theory of the defect solid solution. It is tutorial in nature, and is primarily intended to outline the development of the theory into the mathematical form that is most suitable for the solution of practical problems. The theory treats solid solutions containing distributions of solute defects that distort the solvent lattice and interact elastically with one another. It determines the total strain of the solvent lattice and the elastic contribution to the free energy of the solution in the strong harmonic approximation. The theory is specifically developed for a binary solution of point defects in the absence of external stress. It can be extended to treat multicomponent solutions, stressed solutions, and solutions of finite defects or macroscopic inclusions; the equations governing these complex systems are also presented. The

model is finally used to consider ordering and decomposition reactions in solutions whose components interact elastically.

11162 **Dynamics of interfacial pattern formation.** Ben-Jacob, E.; Goldenfeld, N.; Langer, J.S.; Schoen, G. (Institute for Theoretical Physics, University of California, Santa Barbara, California 93106). *Physical Review Letters;* **51**: No. 21, 1930-1932(21 Nov 1983). Contract AM03-76SF00034.

A phenomenological model of dendritic solidification incorporating interfacial kinetics, crystalline anisotropy, and a local approximation for the dynamics of the thermal diffusion field is proposed. The preliminary results are in qualitative agreement with natural dendritelike pattern formation.

11163 **Electron delocalization by a magnetic field in two dimensions.** Levine, H.; Libby, S.B.; Pruisken, A.M.M. (Schlumberger-Doll Research, Ridgefield, Connecticut 06877). *Physical Review Letters;* **51**: No. 20, 1915-1918(14 Nov 1983).

The problem of two-dimensional localization in the presence of a magnetic field is reconsidered. The existence of extended electronic states is demonstrated by use of the replica formalism and duality arguments. These states are analogs of $\theta = \pi$ vacua in four-dimensional Yang-Mills theories, and occur at the center of each Landau band. The present results complete the explanation of the integrally quantized Hall effect.

6561 Superconductivity

REFER ALSO TO CITATION(S) 10202, 10220, 10224, 10248, 10275, 10420

6570 Theoretical Physics

REFER ALSO TO CITATION(S) 11094

11164 **(EFI—574(61)-82) Diagram summation method by means of legendre transformation by a scalar parameter and its application to an anharmonic oscillator.** Ananikyan, N.S.; Balayan, G.L.; Savvidy, G.K. (Erevanskij Fizicheskij Inst. (USSR)). 1982. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704430.

The summation of an infinite number of diagrams is carried out. The case of the dimension d=1 (anharmonic oscillator) is discussed. The obtained expressions for the ground-state energy are in a satisfactory agreement with the exact results. It is shown that the proposed summation method allows to enlarge by an order the application region as compared to a standard perturbation theory.

11165 **(IC—81/64) Generalized virial relations and the theory of subdynamics.** Obcemea, Ch.; Froelich, P.; Braandas, E.J. (International Centre for Theoretical Physics, Trieste (Italy)). May 1981. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704432.

In this paper, we discuss the implication of the generalized virial relations in the spectral analysis of Liouville operators. In particular, we refer to the existence problem of the analytic continuation of these super-operators and their resolvents occurring in the reduced dynamics description of open systems. For completeness, we outline the main ideas of the subdynamics approach.

11166 **(IC—82/221) Value preserving quantum measurements: impossibility theorems and lower bounds for the distortion.** Ghirardi, G.C.; Rimini, A.; Weber, T. (International Centre for Theoretical Physics, Trieste (Italy)). Nov 1982. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704439.

Extending previous works on the subject, we consider the problem of the limitations to ideal quantum measurements arising from the presence of additive conservation laws. We derive impossibility theorems and lower bounds for the deviations from the ideal schemes, with particular reference to the distorting case.

11167 **(IC—82/228) Symmetry in Kaluza-Klein theory.** Strathdee, J. (International Centre for Theoretical Physics, Trieste (Italy)). Dec 1982. 16p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704441.

A method is described for making harmonic expansions on the internal space of a Kaluza-Klein vacuum in cases where this space is a coset space. This method fully exploits the symmetry of the space and should be useful for the analysis of excitation spectra and, in particular, for constructing the correct zero-mode ansatz in cases where the multi-dimensional gravitational fields are coupled to matter fields of various kinds.

11168 (INIS-mf—8299, pp 150) **Formal perturbation theory.** Pauli, H.C. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11169 (INIS-mf—8299, pp 151-152) **Level density of fermion systems.** Wolter, M.; Feldmeier, H.; Weidenmueller, H.A. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11170 (INIS-mf—8299, pp 152) **Equilibration in fermion systems.** Wolschin, G. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11171 (INIS-mf—8299, pp 152) **Solution of a reduced occupation number equation for fermion systems.** Zhang, J.S.; Wolschin, G. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11172 (INIS-mf—8299, pp 153) **Quantum mechanical derivation of 'collision terms' in the time dependent Hartree-Fock equations.** Pauli, H.C. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11173 (INIS-mf—8299, pp 154) **Model study of two interacting fermi gases.** Buck, P. (Technische Hochschule Darmstadt (Germany, F.R.). Inst. fuer Kernphysik); Feldmeier, H. 1983. (In German). NTIS (US Sales Only), PC A11/MF A01.

In Max-Planck-Institut fuer Kernphysik: Annual report 1982.

11174 **(JINR—E-2-82-779) Proper time, spatial distances and clock synchronization in the locally anisotropic space-time.** Bogoslovskij, G.Yu. (Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics). 1982. 4p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704450.

The relations between the Finsler metric of four-dimensional spacetime and the metric of three-dimensional space is obtained and the simultaneity of events and the algorithm for synchronizing clocks are determined. The method for deriving the expressions of the observable quantities and synchronizing clocks is based on light-signal exchange and is a consequence of the specific Finsler structure of space-time which gives the same equation of light-signal propagation as the general relativity. Within the framework of the general relativistic theory of the locally anisotropic space-time and gravitation, expressions have been obtained for the observable values; the proper time, the spatial distance, and the proper time interval between events at the neighbouring reference points. The specific form of the metric of locally anisotropic space-time used in the work has yielded reasonable expressions of the observable quantities through the values of the fields determining the local anisotropy.

11175 **(LA-UR—83-2295) Family of almost periodic Schroedinger operators.** Baker, G.A. Jr.; Bessis, D.; Moussa, P. (Los Alamos National Lab., NM (USA); CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Theorique). 1983. Contract W-7405-ENG-36. 27p. (CONF-8308153—1). NTIS, PC A03/MF A01. Order Number DE83017308.

From 7. international conference on mathemitical physics; Boulder, CO, USA (1 Aug 1983).

Bellisard et al., introduced a one-dimensional, almost-periodic, discrete Schroedinger operator which is defined by a parameter λ. We allow this parameter to become complex and develop a geometric formalism to control the operator. The support of the spectrum of this operator is the Julia set of the mapping $x^2 - \lambda \rightarrow x$. We prove that the almost-periodicity holds over wide regions of the complex λ-plane, even though Hermiticity fails. 14 references.

11176 **(TRITA-EPP—82-06) Numerical double layer solutions with ionization.** Andersson, D.; Soerensen, J. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Aug 1982. 28p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704459.

Maxwell's equation div D = ro in one dimension is solved numerically, taking ionization into account. Time independent anode sheath and double layer solutions are obtained. By varying voltage, neutral gas pressure, temperature of the trapped ions on the cathode side and density and temperature of the trapped electrons on the anode side, diagrams are constructed that show permissible combinations of these parameters. Results from a recent experiment form a subset. Distribution functions, the Langmuir condition, some scaling laws and a possible application to the lower ionosphere are discussed.

11177 **Quantum manifestations of classical resonance zones.** De Leon, N.; Davis, M.J.; Heller, E.J. (Los Alamos National Laboratory, University of California, Los Alamos, New Mexico 87545). *Journal of Chemical Physics;* **80**: No. 2, 794-799(15 Jan 1984).

We examine the concept of nodal breakup of wave functions as a criterion for quantum mechanical ergodicity. We find that complex nodal structure of wave functions is not sufficient to determine quantum mechanical ergodicity. The influence of classical resonances [which manifest themselves as classical resonance zones (CRZ)] may also be responsible for the seeming complexity of nodal structure. We quantify this by reexamining one of the two systems studied by Stratt, Handy, and Miller [J. Chem. Phys. 71, 3311 (1974)] from both a quantum mechanical and classical point of view. We conclude that quasiperiodic classical motion can account for highly distorted quantum eigenstates. One should always keep this in mind when addressing questions regarding quantum mechanical ergodicity.

11178 **Phase averaging of image ensembles by using cepstral gradients.** Swan, H.W. (Information Systems Laboratory, Stanford University, Stanford, California 94305). *Journal of the Optical Society of America;* **73**: No. 11, 1488-1492(Nov 1983).

The direct Fourier phase averaging of an ensemble of randomly blurred images has long been thought to be too difficult a problem to undertake realistically owing to the necessity of proper phase unwrapping. It is shown that it is nevertheless possible to average the Fourier phase information in an image ensemble without calculating phases by using the technique of cepstral gradients.

11179 **Bayesian approach to limited-angle reconstruction in computed tomography.** Hanson, K.M.; Wecksung, G.W. (Los Alamos National Laboratory, Los Alamos, New Mexico 87545). *Journal of the Optical Society of America;* **73**: No. 11, 1501-1509(Nov 1983). Contract W-7405-ENG-36.

An arbitrary source function cannot be determined fully from projection data that are limited in number and range of viewing angle. There exists a null subspace in the Hilbert space of possible source functions about which the available projection measurements provide no information. The null-space compJonents of deterministic solutions are usually zero, giving rise to unavoidalbe artifacts. It is demonstrated that these artifacts may be reduced by a Bayesian maximum a posteriori (MAP) reconstruction method that permits the use of significant a priori information. Since normal distributions are assumed for the a priori and measurement-error probability densities, the MAP reconstruction method presented here is equivalent ot the minimum-variance linear estimator with nonstationary mean and covariance ensemble characterizations. A more comprehensive Bayesian approach is suggested in which the ensemble mean and covariance specifications are adjusted on the basis of the measurements.

11180 **Early years of relativity.** Dirac, P.A.M. pp 79-90 of Albert Einstein: historical and cultural perspectives. Centennial symposium in Jerusalem. Holton, G.; Elkana, Y. (eds.). Princeton, NJ; Princeton University Press (1982).

The author describes how he was affected by the theory of relativity when it was first presented to the public. He was a student of engineering at Bristol University in England at the time. He also describes the impact on the general public. He discusses the introduction of quantum mechanics in 1925 and the subsequent discussion between Bohr and Einstein. The incompleteness of Einstein's theory of gravitation and the unification of the gravitational field and electromagnetic field are also addressed. (SC)

6580 Mathematical Physics

REFER ALSO TO CITATION(S) 11046, 11375

11181 **(LA-UR—83-3545) Semigroup associated with a quasi-linear system in which the coupling is linear.** Pimbley, G.H. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 19p. (CONF-8307111—1). NTIS, PC A02/MF A01. Order Number DE84004227.

From American Mathematical Society summer workshop; Berkeley, CA, USA (11 Jul 1983).

Until now, semigroup solution has been successful mainly for linear and mildly nonlinear initial value problems having but a single partial differential equation (PDE). Attempts to apply standard semigroup generation principles to systems of nonlinear PDEs have encountered difficulties, though papers have appeared that treat mildly nonlinear systems. The purpose of this work is to demonstrate ideas, involving the Trotter product formula, that may be efficacious in finding semigroups for coupled systems of quasi-linear PDEs. This is a class for which semigroup generation principles involving accretiveness of an operator have generally failed. These Trotter product ideas were originally explained by J. Marsden, using a profound Banach manifold approach. 5 references.

70 FUSION ENERGY

7001 Plasma Research

REFER ALSO TO CITATION(S) 10453, 11357

11182 **(AD-A—130808/9) Polarization studies in electron cyclotron heating experiments on the Versator II tokamak. Final report 25 Aug 1980 - 25 Aug 1981.** (JAYCOR, Alexandria, VA (USA)). 30 Jul 1982. 24p. NTIS, PC A02/MF A01.

Preliminary results of the ECH experiment using the MIT Versator II with polarized microwave radiation were obtained. Decreases in both loop voltage and line average plasma density were measured as a function of power and toroidal angle of microwave beam injection. Thompson scattering measurements indicate an increase in the central electron temperature. These investigations showed a distinct asymmetry behavior for both polarizations.

11183 **(CONF-820944—10) Diagnostic protection techniques in steady state, high power RF and microwave.** Glowienka, J.C. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 19p. NTIS, PC A02/MF A01. Order Number DE84004450.

From Workshop on diagnostics for fusion reactor conditions (International school of plasma physics); Varenna, Italy (6 Sep 1982).

The use of high power RF and microwave heating in the range of 10's of MHz through 10's of GHz in the next generation devices will require that diagnostics be hardened and isolated from the plasma and heating environment. Diagnostics used on the ELMO Bumpy Torus (EBT) have been faced with such a hostile environment, in steady state, and solutions have evolved to make diagnostic measurements possible.

11184 (CONF-821103—96-Draft.) Monte Carlo methods for optimizing torsatron configurations. Rome, J.R.; Fowler, R.H.; Lyon, J.F.; Hirshman, S.P. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE84004459.

From American Nuclear Society winter meeting; Washington, DC, USA (14 Nov 1982).

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It is desirable to optimize torsatron configurations to provide minimum transport losses. Neoclassical calculations of transport coefficients for torsatron configurations have been performed for simplified fields or under the assumption of conservation of the longitudinal adiabatic invarient, J. However, Fourier analysis of torsatron fields for real coil configurations shows that in general, about ten harmonics are required to represent the field. Furthermore, guiding center orbits computed in these fields do not conserve J. In fact, in present day torsatrons collisionless orbits may traverse the entire radial extent of the plasma. When collisions are included, it is therefore doubtful that the transport problem can be treated locally. When particles on these large orbits are lost from the plasma, a significant radial electric field is created which must be included in the analysis.

11185 (CONF-831203—69) End cell I & C requirements for operating tandem mirror reactors. Gorker, G.E.; Osher, J.E. (Oak Ridge National Lab., TN (USA); Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004568.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

The next generation of fusion reactors will be developed to achieve near-ignition conditions and operate in a tritium environment for significant periods of time. Radiation-hardened diagnostic instrumentation must be developed for these reactors. Although neutral beam injection (NBI) will be used for plasma heating and fueling of experimental fusion machines like MFTF-α + T, it is believed that ion cyclotron resonance heating (ICRH) will be used in future machines for heating the plasma. When rf heating is used, fueling will be accomplished with gas puffing and advanced fuel injectors. End cell coils, NBI, and microwave power injectors are needed to provide adequate confinement. Microwave power and NBI control the electostatic potentials of the plug and barrier. Low-frequency rf power provides drift pump control of the ions so that they are lost radially, enhancing the use of direct converters that collect the axially flowing electrons. Direct or indirect measurements of electrostatic potential barriers, electron density, and temperature appear necessary to control the NBI and microwave power generators. This paper discusses some of the end cell instrumentation and control (I & C) systems believed to be necessary for tandem mirror reactors.

11186 (DOE/ER/53122—2) Plasma magnetic field measurement by intracavity absorption. Progress report, June 1, 1983-May 31, 1984. Brink, G.O. (State Univ. of New York, Buffalo (USA)). Jan 1984. Contract AC02-81ER53122. 22p. NTIS, PC A02/MF A01. Order Number DE84005152.

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Dye laser intracavity absorption (ICA) is being studied as a potential diagnostic for plasma or neutral beam systems. For magnetic field measurements it is necessary to make Zeeman effect measurements on the resonance transition of atomic lithium on a millisecond time scale. To do this it is necessary to sweep the dye laser in wavelength at a rapid rate so that the absorber can be sampled many times during the measurement. Our results indicate that the ICA signal becomes small at high sweep rates limiting the rate at which such sweeping may be carried out. It may be possible to avoid this limitation by chopping the pump laser. The studies of coupled cavity ICA are continuing, and are discussed in detail in an appendix. An ICA system using a dye cell has been designed, and supplementary experiments involving the observation of ICA in a ring dye laser are discussed.

11187 (DOE/NBM—3017242) MHD activity in the ISX-B tokamak: experimental results and theoretical interpretation. Carreras, B.A.; Dunlap, J.L.; Bell, J.D.; Charlton, L.A.; Cooper, W.A.; Dory, R.A.; Hender, T.C.; Hicks, H.R.; Holmes, J.A.; Lynch, V.E. (Oak Ridge National Lab., TN (USA); Texas Univ., Austin (USA). Inst. for Fusion Studies). 1982. Contract W-7405-ENG-26. 63p. NTIS, PC A04/MF A01. Order Number DE83017242.

The observed spectrum of MHD fluctuations in the ISX-B tokamak is clearly dominated by the $n=1$ mode when the $q=1$ surface is in the plasma. This fact agrees well with theoretical predictions based on 3-D resistive MHD calculations. They show that the $(m=1; n=1)$ mode is then the dominant instability. It drives other $n=1$ modes through toroidal coupling and $n>1$ modes through nonlinear couplings. These theoretically predicted mode structures have been compared in detail with the experimentally measured wave forms (using arrays of soft x-ray detectors). The agreement is excellent. More detailed comparisons between theory and experiment have required careful reconstructions of the ISX-B equilibria. The equilibria so constructed have permitted a precise evaluation of the ideal MHD stability properties of ISX-B. The present results indicate that the high β ISX-B equilibria are marginally stable to finite eta ideal MHD modes. The resistive MHD calculations also show that at finite β there are unstable resistive pressure driven modes.

11188 (EGG-M—10483) Vaporized wall material/plasma interaction during plasma disruption. Merrill, B.J.; Jardin, S.C.; Carroll, M.C. (EG and G Idaho, Inc., Idaho Falls (USA); Princeton Univ., NJ (USA). Plasma Physics Lab.; Illinois Univ., Urbana (USA)). 1983. Contract AC07-76ID01570. 7p. (CONF-831203—83). NTIS, PC A02/MF A01. Order Number DE84004541.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The purpose of this paper is to discuss a new plasma disruption model that has been developed for analyzing the consequences to the limiter/first wall structures. This model accounts for: nonequilibrium surface vaporization for the ablating structure, nonequilibrium ionization of and radiation emitted from the ablated material in the plasma, plasma particle and energy transport, and plasma electromagnetic field evolution during the disruption event. Calculations were performed for a 5 ms disruption on a stainless steel flat limiter as part of a d-shaped first wall. These results indicated that the effectiveness of the ablated wall material to shield the exposed structure is greater than predicted by earlier models, and that the rate of redeposition of the ablated wall material ions is very dramatic. Impurity transport along magnetic field lines, global plasma motion, and radiation transport in an optically thick plasma are important factors that require additional modeling. Experimental measurements are needed to verifty these models.

11189 (EUR-CEA-FC—1183) Study of the relevance of simple solutions to nonlinear rate equations with time-varying coefficients. Wilhelmsson, H.; Jancel, R. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Recherches sur la Fusion Controlee). May 1983. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE84750334.

The possibility of accounting for time-dependent coefficients in a nonlinear rate equation, including a source term, is studied in circular cylindrical geometry. It is shown that the equation can be transformed to a form which allows for a simple particular solution, provided a certain combination of the time-dependent coefficients is a constant, or nearly a constant. The relevance of the solutions for describing the evolution of a plasma in the ionization phase is considered.

11190 **(EUR-CEA-FC—1188) Simulation and interpretation codes for the JET ECE diagnostic. Part 2. Numerical details.** Bartlet, D.V. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Recherches sur la Fusion Controlee). Jun 1983. 65p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE84750337.

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The second part describes the organization of the codes developed for the analysis of electron emission measurements in JET, the numerical details of the operation of the codes written at CEA-Fontenay and gives information about the required input data (fort the first part see: EUR-CEA-FC-1187).

11191 **(EUR-CEA-FC—1190) Measurement of electron cyclotron emission on the T.F.R. Tokamak. Application to the study of disruptions.** Laurent, L. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Recherches sur la Fusion Controlee; Paris-11 Univ., 91 - Orsay (France)). Jun 1983. 284p. (In French). NTIS (US Sales Only), PC A13/MF A01. Order Number DE84750335.

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Measurement of the electron cyclotron radiation from the hot plasma confined by the magnetic field of the T.F.R. tokamak are presented. This emission, in the millimetre wavelength range, has been investigated with a set of two Fabry-Perot interferometers. In part of the spectrum, the plasma radiates as a blackbody. This characteristic has been exploited to measure routinely the electron temperature. New results have been obtained, in particular concerning the study of disruptions. The possibility of measuring the plasma density from the electron cyclotron emission in the part of the spectrum where the plasma is not opaque has been investigated.

11192 (INIS-mf—8663, pp 12) **High power plasma wave experiments in TORTUS.** Brennan, M.H.; Cross, R.C.; Jessup, B.L.; Lehane, J.A.; Murphy, A.B. (Sydney Univ. (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11193 (INIS-mf—8663, pp 94) **Beam plasma discharge.** Boswell, R.W. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11194 (INIS-mf—8663, pp 18) **Some aspects of the coupling of the r.f. power to a magnetoplasma.** Prytz, A.; Boswell, R.W. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11195 (INIS-mf—8663, pp 20) **Spatially scanning submillimeter laser interferometer for a small tokamak.** Falconer, I.S.; Krug, P.A.; Stimson, P.A. (Sydney Univ. (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11196 (INIS-mf—8663, pp 21) **Extreme forward scattering from ion acoustic waves in a laboratory plasma.** James, B.W. (Sydney Univ. (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11197 (INIS-mf—8663, pp 22) **Measurement of large scale density fluctuations from phase scintillations of a probing electromagnetic wave.** Sharp, L.E. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11198 (INIS-mf—8663, pp 23) **Hydromagnetic equilibrium and stability in high beta toroidal plasmas.** Dewar, R.L. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11199 (INIS-mf—8663, pp 24) **Spectrum of resistive MHD modes in cylindrical plasmas.** Grimm, R.C.; Ryu, C.M. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11200 (INIS-mf—8663, pp 25) **Heating and confinement in LT-4.** Cheetham, A.D.; Hamberger, S.M.; How, J.A.; Kuwahara, H.; Morton, A.H.; Sharp, L.E.; Vance, C.F. (Australian National Univ., Canberra. Research School of Physical Sciences); Hogg, G.R. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11201 (INIS-mf—8663, pp 26) **MHD activity and disruptions in LT-4.** Cheetham, A.D.; How, J.A.; Kuwahara, H.; Morton, A.H. (Australian National Univ., Canberra. Research School of Physical Sciences); Hogg, G.R. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11202 (INIS-mf—8663, pp 27) **Runaway electrons and rational q(r) in LT-4.** Cheetham, A.D.; How, J.A.; Kuwahara, H.; Morton, A.H. (Australian National Univ., Canberra. Research School of Physical Sciences); Hogg, G.R. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11203 (INIS-mf—8663, pp 29) **Magnetic probe measurements of torsional Alfven waves in tortus tokamak.** Cross, R.C.; Blackwell, B.D.; Borg, G.; Brennan, M.H.; Lehane, J.A. (Sydney Univ. (Australia). Dept. of Plasma Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11204 (INIS-mf—8663, pp 30) **Radial plasma flux caused by the interaction of m = +-1 Alfven waves.** Cheetham, A.D. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11205 (INIS-mf—8663, pp 31) **Efficiency of RF current drive schemes.** Hugrass, W.N. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11206 (INIS-mf—8663, pp 39) **Visco-resistive instabilities.** Hosking, R.J. (Waikato Univ., Hamilton (New Zealand)); Tendys, J.A. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11207 (INIS-mf—8663, pp 44) **Observations of runaway electrons in the Tortus tokamak.** Cross, R.C.; Jia-Rui, L.; Giannone, L. (Sydney Univ. (Australia). Dept. of Plasma Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11208 (INIS-mf—8663, pp 45) **Phase measuring systems for plasma wave experiments.** Borg, G.G. (Sydney Univ. (Australia). Dept. of Plasma Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11209 (INIS-mf—8663, pp 46) **Thomson scattering measurements on Tortus.** Niland, R.A. (Sydney Univ. (Australia). Dept. of Plasma Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11210 (INIS-mf—8663, pp 48) **Data acquisition and analysis on LT-4.** Cheetham, A.D.; Corbould, M.A.; How, J.A.; Kuwahara, H.; Vance, C.F. (Australian National Univ., Canberra. Research School of Physical Sciences); Hogg, G.R. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11211 (INIS-mf—8663, pp 49) **In waveguide instruments for infrared and millimetre waves.** How, J.A.; Morey, I.J. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11212 (INIS-mf—8663, pp 53) **Numerical studies of resistive instabilities in toroidal plasmas.** Storer, R.G. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11213 (INIS-mf—8663, pp 54) **Results from the low-power, long-duration Rotamak IV experiment.** Tendys, J.; Turley, M. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11214 (INIS-mf—8663, pp 58) **Nanosecond time-resolved studies of r.f. plasma development.** Sato, N.; Haydon, S.C. (New England Univ., Armidale (Australia). Dept. of Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11215 (INIS-mf—8663, pp 61) **Review of time-dependent, three-dimensional resistive magnetohydrodynamic calculations.** Killeen, J. (Lawrence Livermore National Lab., CA (USA)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11216 (INIS-mf—8663, pp 62) **R.F. heating of plasma using the spatial Alfven resonance.** Donnelly, I.J.; Clancy, B.E. (Australian Atomic Energy Commission Research Establishment, Lucas Heights); Cramer, N.F. (Sydney Univ. (Australia). School of Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11217 (INIS-mf—8663, pp 63) **Observations of MHD surface waves in a plasma column.** Collins, G.A. (Sydney Univ. (Australia). Dept. of Plasma Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11218 (INIS-mf—8663, pp 64) **Studies of hydromagnetic waves and oscillations in current carrying cylindrical plasmas.** McCarthy, A.L. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11219 (INIS-mf—8663, pp 65) **Solutions of the drift kinetic equation.** Radford, G.; Liley, B.S. (Waikato Univ., Hamilton (New Zealand)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11220 (INIS-mf—8663, pp 66) **Long path optical interferometry of plasmas using polarization and modified Jamin systems.** Woolsey, G.A.; Wasson, D.S. (New England Univ., Armidale (Australia). Dept. of Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11221 (INIS-mf—8663, pp 70) **Matching of wave launching structures to a high power oscillator.** Murphy, A.B.; Jessup, B.L. (Sydney Univ. (Australia). Dept. of Plasma Physics); Watt, G.C. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11222 (INIS-mf—8663, pp 71) **Ion-cyclotron and fast surface waves.** Cramer, N.F. (Sydney Univ. (Australia). School of Physics); Donnelly, I.J. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11223 (INIS-mf—8663, pp 72) **Dispersion and damping of Alfven waves.** Winglee, R.M. (Sydney Univ. (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11224 (INIS-mf—8663, pp 73) **Thin-film detectors for submillimetre-wave diagnostics of plasmas.** Whitbourn, L.B.; Macfarlane, J.C. (Commonwealth Scientific and Industrial Research Organization, Lindfield (Australia). Div. of Applied Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11225 (INIS-mf—8663, pp 74) **Generation of electromagnetic waves in a beam plasma system.** Boswell, R.W.; Morey, I. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11226 (INIS-mf—8663, pp 75) **Generation of Langmuir turbulence in a magnetized beam-plasma system.** Porteous, R.K.; Boswell, R.W. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11227 (INIS-mf—8663, pp 79) **RF heating of a toroidal plasma with two-ion species.** Sy, W. N-C (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11228 (INIS-mf—8663, pp 84) **Nonlinear laser wave-packet propagation in plasmas and soliton formation.** Kentwell, G. (New South Wales Univ., Kensington (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11229 **(LA-UR—83-3480) Current sensing in magnetic fusion experiments by Faraday rotation in single-mode optical fibers.** Chandler, G.I.; Jahoda, F.C. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 8p. (CONF-831203—48). NTIS, PC A02/MF A01. Order Number DE84004326.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

Portions are illegible in microfiche products.

We find that sensors exploiting the Faraday effect in single-mode optical fibers are practical means of measuring large currents in the MFE environment. Work still needs to be done to overcome the effects of linear birefringence. We have seen distortion caused by dynamic stress-induced birefringence and shown the importance of physically eliminating it because of the difficulty of treating it analytically.

11230 **(PPPL—2046) Measurements of the hydrogenic recombination coefficient for the TFTR vacuum vessel.** Dylla, H.F.; Cecchi, J.L.; Knize, R.J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Dec 1983. Contract AC02-76CH03073. 22p. (CONF-830795—7). NTIS, PC A02/MF A01. Order Number DE84004296.

From Symposium on energy removal and particle control and toroidal fusion devices; Princeton, NJ, USA (26 Jul 1983).

Characteristic values of the recombination rate coefficient for hydrogen and deuterium in stainless steel have been measured for the inner wall of the TFTR vacuum vessel for vessel temperatures of 25 to 100 C. In situ measurements of k/sub r/ are important for predicting the hydrogen isotope retention in the wall as a function of time, temperature, and discharge exposure, particularly because existing laboratory measurements of k/sub r/ for stainless steel span a range of four orders of magnitude. The measurement technique involved the observation of the decrease in hydrogen pressure during a glow discharge in the TFTR vacuum vessel with an initial static gas fill. The resulting values of k/sub r/ at 25 C are in the range of (0.4 to 4) x 10^{-27} cm^4-s^{-1} assuming a value of the hydrogenic diffusivity of 2 x 10^{-12} cm^2-s^{-1} at room temperature. No significant isotopic dependence was observed and the temperature dependence of k/sub r/ is consistent with the literature value (0.5 eV) of the activation energy. The implications of this range of values of k/sub r/, for the estimation of the in-vessel tritium inventory following D-T operation in TFTR are discussed.

11231 **(PPPL—2052) Parametric excitation of ion Bernstein waves by a fast wave antenna in the ion cyclotron frequency range.** Skiff, F.; Ono, M.; Wong, K.L. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Nov 1983. Contract AC02-76CH03073. 16p. NTIS, PC A02/MF A01. Order Number DE84004301.

Parametric excitation of ion Bernstein waves is observed with an ICRF fast wave induction loop antenna in the ion cyclotron frequency range (ω/sub o/ ~ 2Ω/sub i/ - 4Ω/sub i/). Important features of the decay process are investigated and discussed.

11232 **(PPPL—2055) Preliminary semiempirical transport models.** Singer, C.E. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Nov 1983. Contract AC02-76CH03073. 42p. (CONF-830247—1). NTIS, PC A03/MF A01. Order Number DE84003484.

From Workshop on transport analysis codes for tokamaks with strong auxiliary heating; Princeton, NJ, USA (28 Feb 1983).

A class of semiempirical transport models is proposed for testing against confinement data from tokamaks and for use in operations planning and machine design. A reference model is proposed to be compatible with published confinement data. Theoretical considerations are used to express the anomalous transport coefficients in terms of appropriate dimensionless parameters.

11233 **(PPPL—2056) Attainment of high confinement in neutral beam heated divertor discharges in the PDX tokamak.** Kaye, S.M.; Bell, M.; Bol, K.; Boyd, D.; Brau, K.; Buchenauer, D.; Budny, R.; Cavallo, A.; Couture, P.; Crowley, T. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Nov 1983. Contract AC02-76CH03073. 35p. NTIS, PC A03/MF A01. Order Number DE84004306.

The PDX divertor configuration has recently been converted from an open to a closed geometry to inhibit the return of neutral gas from the divertor region to the main chamber. Since then, operation in a regime with high energy confinement in neutral beam heated discharges (ASDEX H-mode) has been routine over a wide range of operating conditions. These H-mode discharges are characterized by a sudden drop in divertor density and H/sub α/ emission and a spontaneous rise in main chamber plasma density during neutral beam injection. The confinement time is found to scale nearly linearly with plasma current, but it can be degraded due to either the presence of edge instabilities or heavy gas puffing. Detailed Thomson scattering temperature profiles show high values of Te near the plasma edge (~ 450 eV) with sharp radial gradients (~ 400 eV/cm) near the separatrix. Density profiles are broad and also exhibit steep gradients close to the separatrix.

11234 **(PPPL—2064) Stability of n = 1 internal modes in tokamaks.** Manickam, J. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Dec 1983. Contract AC02-76CH03073. 37p. NTIS, PC A03/MF A01. Order Number DE84004300.

An extensive numerical study has been carried out for internal modes with toroidal mode number unity. These are internal kink modes, when the q = 1 surface falls within the plasma, and have a ballooning characteristic when q/sub axis/ > 1. Both modes show a dependence on the pressure and have a second region of stability at high β. A parameter survey has been conducted, varying the geometry, i.e., aspect ratio, ellipticity, triangularity, etc. and the current profiles, through the pressure and safety factor. The principal results show that the modes are dependent on the geometry and are strongly stabilized by high-order, noncircular effects. Broader pressure profiles and reduced shear are favorable for limiting the instability.

11235 **(PPPL—2065) Particle and heat flux measurements in PDX edge plasmas.** Budny, R.; Manos, D. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Dec 1983. Contract AC02-76CH03073. 23p. NTIS, PC A02/MF A01. Order Number DE84004305.

This paper describes the use of novel combined Langmuir-calorimeter probes to measure edge plasma conditions near the midplane in PDX. The probes consisted of up to five Langmuir probes and up to two calorimeters. Single and double probe characteristics yield n/sub e/ and T/sub e/ which are compared with that derived from a triple probe analysis. The calorimeters measure heat flux in the electron and ion drift directions. This paper presents time-resolved radial profiles of n/sub e/, T/sub e/, V/sub F/ (floating potential), and P (heat flux) during high power neutral beam-heated, single-null discharges and circular scoop limiter discharges. The temporal dependence of these quantities displays the previous observed behavior with respect to gross discharge characteristics; however, an additional dependence on confinement mode has been observed. During the H-mode of energy confinement, a transient depression of n/sub e/, T/sub e/, and P occurs in the scrape-off plasma.

11236 **(RL—83-009) Physics of laser compression of plasmas.** Key, M.H. (Rutherford Appleton Lab., Chilton (UK)). Jan 1983. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704458.

These lecture notes serve as a supplement to the author's Lectures on the Physics of the Super Dense Region' (Laser Plasma Interactions. Ed. R.A. Cairns and J.J. Sanderson. SUSSP publications Dpt. Phys., Univ. Edinburgh. (1980)). Material, revised and updated to reflect the significant developments which have occurred in the last three years, is discussed under the headings; thermal conduction, ablation governed by electron thermal conduction, experimental study of mass ablation rate and ablation pressure, thermal smoothing of pressure variations due to non-uniform irradiation, and Rayleigh-Taylor instability.

11237 **(SAI—83-1147/PRI-71) Magnetic fusion energy program. Final report.** Aamodt, R.E.; Catto, P.J.; D'Ippolito, D.A.; Francis, G.L.; Hafizi, B.; Lee, X.S.; Myra, J.R.; Rohde, D.C.; Tsang, K.T. (Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.). 31 Dec 1983. Contract AC03-76ET53057. 66p. NTIS, PC A04/MF A01. Order Number DE84004896.

During the past two years SAI/PRI has expended essentially all its DOE effort on issues central to the mirror fusion program. In addition to extending our equilibrium, transport, and stability studies of standard tandem mirrors, we have become deeply involved in investigations of tandem mirrors with thermal barriers, and hot particle populations employed for stability. Technical reviews are given of our efforts and an assessment of their impact on the mirror program. We also summarize our final bumpy torus equilibrium considerations as well as an application of our stability techniques to the study of hot particle effects on ballooning modes in tokamaks.

11238 **(TRITA-EPP—82-10) Critical ionization velocity mechanism for the case of gas mixture.** Raadu, M.A. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Aug 1982. 8p. (CONF-820618—16). NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704461.

From International conference on plasma physics; Goeteborg, Sweden (7 Jun 1982).

The theory of the critical ionization velocity mechnisms is discussed. In the case of gas mixture the critical velocity is expected to depend on the ionization cross sections. An analytic approximation is introduced which can be used to set limits on a generalized expression for the critical velocity of gas mixtures.

11239 **(TRITA-EPP—82-13) Critical ionization velocity - a bibliography.** Axnaes, I.; Brenning, N.; Raadu, M.A. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Dec 1982. 28p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704463.

A list of all relevant contributions, known to the authors, concerning the critical ionization velocity phenomena is presented. The contributions are classified and described in a few sentences.

11240 **(TRITA-EPP—82-14) Review of impact experiments on the critical ionization velocity.** Brenning, N. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Oct 1982. 40p. (CONF-8210190—1). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704464.

From Workshop on Alfven's critical velocity effect; Garching bei Muenchen, F.R. Germany (11 Oct 1982).

The impact experiments on the critical ionization velocity (V sub (c)) interactions are reviewed. In these experiments, a highly ionized plasma impacts on a neutral gas cloud. V sub (c)-interaction is observed only when the magnetic field, and the neutral gas density, are above certain critical limits. The values of these limits, however, differ between the experiments. The extrapolation of the laboratory results to space applications is also discussed.

11241 **(TRITA-EPP—82-15) Circuit effects on pierce instabilities, and double-layer formation.** Raadu, M.A.; Silevitch, M.B. (Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics). Nov 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704465.

The role of the Pierce instability in the formation of double layers is considered and compared with that of the Buneman instability. Pierce instabilities have been identified in a double-layer experiment, where they lead to ion trapping. Here the effects of external circuit elements are considered. In the case of immobile ions the onset criteria are unaffected, but in the unstable range the growth rate is reduced by the external impedance. Required experimental values of the circuit elements are estimated. The possible relevance to computer simulations is noted.

11242 **(TRITA-PFU—82-11) Zero-dimensional EXTRAP computer code.** Karlsson, P. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Oct 1982. 31p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704466.

A zero-dimensional computer code has been designed for the EXTRAP experiment to predict the density and the temperature and their dependence upon parameters such as the plasma current and the filling pressure of neutral gas. EXTRAP is a Z-pinch immersed in a vacuum octupole field and could be either linear or toroidal. In this code the density and temperature are assumed to be constant from the axis up to a breaking point from where they decrease linearly in the radial direction out to the plasma radius. All quantities, however, are averaged over the plasma volume thus giving the zero-dimensional character of the code. The particle, momentum and energy one-fluid equations are solved including the effects of the surrounding neutral gas and oxygen impurities. The code shows that the temperature and density are very sensitive to the shape of the plasma, flatter profiles giving higher temperatures and densities. The temperature, however, is not strongly affected for oxygen concentration less than 2% and is well above the radiation barrier even for higher concentrations.

11243 **(TRITA-PFU—82-12) Experimental studies of equilibrium in a linear EXTRAP z-pinch discharge.** Drake, J.R. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Oct 1982. 19p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704467.

Experimental studies of the radial equilibrium condition in linear Extrap discharge have been carried out. Bennet like scaling, NT α I^2 sub (p), has been observed where N is the plasma line den-

sity, T is the tempreature and I sub (p) is the plasma discharge current.

11244 **(TRITA-PFU—82-14) Finite larmor radius stabilization of Z-pinches.** Hellsten, T. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Dec 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704468.

Finite Larmor radius stabilization of Z-pinches is discussed. Stability criteria can be derived for a class of equilibria having constant mass and current density. The internal modes can be stabilized provided the line density not exceed a critical value of the order of 10^{18} ions/m.

11245 **(TRITA-PFU—83-01) Alfven wave excitation in a cavity with a transverse magnetic field.** Bures, M. (Svensk Kaernbraenslefoersoerjning AB, Stockholm). Dec 1982. 31p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704469.

A transversely magnetized cylindrical plasma model with an internal rod conductor is used to approximate the FIVA internal ring device of Spherator type with a purely poloidal magnetic field. It is shown that an excitation asymmetry along the plasma column, i.e. with a wave number k sub (z) does not equal 0, introduces a coupling between the magnetoacoustic and shear Alfven waves in the frequency range $\omega << \omega$ sub (ci). The introduction of an equilibrium mass motion along the plasma cylinder introduces a flow continuum. Simultaneously the Alfven resonance frequency becomes Doppler shifted. The experimental observations indicate that cavity modes do not build up in the FIVA device in the case of nonsymmetric excitation. If on the other hand the exciting structure becomes symmetric, i.e. with k sub (z) equals 0, the magnetoacoustic resonance become excited. The resulting Q values are rather low which indicates that the coupling to the shear wave through the Hall electric field cannot be neglected.

11246 **(TRITA-PFU—83-03) Interaction of MHD waves with a plasma surrounded by a cold gas-mantle.** Bures, M. (Royal Inst. of Tech., Stockholm (Sweden). Plasma Physics and Fusion Research). Jan 1983. 37p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704470.

In cold gas-mantle systems a partially ionized boundary layer is formed which becomes highly resistive to the magentoacoustic waves. Especially below the ion gyro frequency ω sub (ci) the effective resistivity due to ion-neutral collisions can attain values being an order of magnitude higher than the Spitzer resistivity. Thus, a substantial part of the RF power available at the antenna can be damped in such a layer. The application of the RF power in the Alfven wave frequency range of the internal ring device FIVA results in a relatively powerful plasma heating. The plasma-neutral gas balance is strongly modified by this power input, as well as the plasma equilibrium which becomes a sensitive function of the neutral gas content of the plasma. An RF power of the order of 0.5 MW is absorbed in the plasma.

11247 **(UCID—19943) Initial simultaneous Thomson-scattering measurements in the TMX-U tandem mirror.** Goodman, R.K.; Rognlien, T.D. (Lawrence Livermore National Lab., CA (USA)). 27 Dec 1983. Contract W-7405-ENG-48. 19p. NTIS, PC A02/MF A01. Order Number DE84005225.

In this report, we briefly describe the TMX-U Thomson-scattering systems; we compare TMX-U velocity-distribution measurements with computer modeling; and we present and discuss our first simultaneous measurements of end-plug and central-cell electron temperatures.

11248 **(UCRL—89430) Development of soft x-ray streak cameras at Lawrence Livermore National Laboratory.** Medecki, H.; Phillips, G.E.; Bushman, J.F. (Lawrence Livermore National Lab., CA (USA)). 27 Jun 1983. Contract W-7405-ENG-48. 12p. NTIS, PC A02/MF A01. Order Number DE83015841.

Soft x-ray streak cameras are used in conjunction with several instruments for the diagnostic of laser irradiated targets. A program was undertaken to develop cameras satisfying the requirements of the laser facility, to improve the reliability and performance of the camera and to reduce the level of effort required to set and operate each diagnostic. The implemented soft x-ray streak cameras can be operated either manually or automatically.

11249 **(UPTEC—8254R) MHD-equilibrium and stability of a z-pinch in an external magnetic field.** Brynolf, J. (Uppsala Univ. (Sweden). Inst. of Tech.). May 1982. 96p. NTIS (US Sales Only), PC A05/MF A01. Order Number DE83704471.

The freeboundary of a sharp z-pinch plasma surrounded by four external conductors, all carrying the same current, is solved. This problem, which is considered as two-dimensional, is transformed by a conformal mapping of the vacuum domain onto the outside of the unit circle. In this area both the complex potential and the mapping itself are analytical functions with well-known boundary values and hence they can be solved uniquely. For the configuration where the external conductors lie in the corner of a square, an analytical expression for the coordinates of the surface is found. Each ratio between the plasma and the vacuum currents results in a family of surfaces in which each member can be labeled either with the magnetic field strength on the surface or with the distance to the external conductors. In section III, the energy principle is used to investigate the stability of the equilibrium configurations against two-dimensional displacements. They are found both analytically and by computer to be unstable for all parametervalues. Without external currents any translation gives marginal stability. For the case with conductors forming a square an analysis of the stability against rigid-body translation gives the opposite result. Then the external currents instead have a stabilizing effect.

11250 **(LA-tr—84-3) Stark spectroscopy of hydrogen lines in turbulent plasma. 1. Low-frequency turbulence.** Berezin, A.B.; Lyublin, B.V.; Yakovlev, D.G. (Los Alamos National Lab., NM (USA); Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1984. Contract W-7405-ENG-36. C; NIIEFA-P-K-0609, 1983. 52p. NTIS, PC A03/MF A01. Order Number DE84004443.

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Set forth sequentially are the results of calculations of the Stark broadening of the spectral lines of hydrogen atoms H/sub α/, H/sub β/ and H/sub γ/ in plasma under the influence of low-frequency (quasistatic) electric microfields. The results are presented in a form which is convenient for practical utilization during processing of the data of various experiments on the study of plasma. Also given are calculation formulas, graphs and tables, which associate the parameters of the plasma with the parameters of the profiles of the lines H/sub α/, H/sub β/ and H/sub γ/. Basic attention is given to spectroscopy of turbulent plasma. Along with the results of studies published earlier, a series of original results is set forth. Specifically, a method is proposed for measuring the parameters of a low-frequency field according to the position of the center of gravity of the figure near one-half of the profile of the line.

11251 **(LA-tr—84-2) Study of turbulence of plasma of a rapid linear theta-pinch according to the Stark broadening of the spectral lines of deuterium.** Berezin, A.B.; Lyublin, B.V.; Yakovlev, D.G. (Los Alamos National Lab., NM (USA); Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)). 1984. Contract W-7405-ENG-36. C; NIIEFA-P-K-0586, 1982. 18p. NTIS, PC A02/MF A01. Order Number DE84004675.

Analysis of the contours of the spectral lines of deuterium D/sub α/ and D/sub β/, irradiated by the theta-pinch plasma of the UTRO unit in the stage of rapid compression, indicates the presence of intensive low-frequency (omega much less than omega/sub pe/) oscillations of the plasma with an average amplitude $E_0 \approx$ 200 kv/cm, and a very small spread of the ampitudes $\Delta E_0/E_0 \leq 0.1$. The experimental data may be explained if one assumes that oscillating of the near group of modes, of lower-hybrid drift instability, takes place in the plasma. Such turbulence is capable of effectively accelerating electrons at small pitch-angles along the magnetic field by the mechanism of resonance diffusion, which may be the reason for the occurrence of X-ray radiation, observed in the stage of maximum compression.

11252 rf stabilization of an axisymmetric tandem mirror. Ferron, J.R.; Hershkowitz, N.; Breun, R.A.; Golovato, S.N.; Goulding, R. (University of Wisconsin, Nuclear Engineering Department, Madison, Wisconsin 53706). *Physical Review Letters;* **51**: No. 21, 1955-1958(21 Nov 1983). Contract AC02-78ER04861.

Plasma with significant central-cell beta can be sustained in a tandem mirror composed of three axisymmetric simple mirror cells by the use of ion-cyclotron resonant heating. Radial ponderomotive force due to the rf electric field opposes the centrifugal force due to the field-line curvature to ensure interchange stability. This is indicated by the sensitive dependence of the plasma stability on the sign of the difference between the rf frequency and the ion-cyclotron frequency.

11253 Stability of n = 1 kink modes in bean-shaped tokamaks. Manickam, J.; Grimm, R.C.; Okabayashi, M. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physical Review Letters;* **51**: No. 21, 1959-1962(21 Nov 1983). Contract AC02-76CH03073.

Numerical studies show that by indenting the small-major-radius side of conventional finite-aspect-ratio tokamaks, significant improvements to the stability of pressure-driven ideal magnetohydrodynamics modes can be achieved. The internal n = 1 kink mode can be stabilized completely with quite modest indentation. In the presence of a nearby conducting wall, kink-ballooning mode stability is also improved, and accessibility to a second stable region at high plasma β is possible.

11254 Ballooning mode stability of bean-shaped cross sections for high-β tokamak plasmas. Chance, M.S.; Jardin, S.C.; Stix, T.H. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physical Review Letters;* **51**: No. 21, 1963-1966(21 Nov 1983). Contract AC02-76CH03073.

Indentation of a tokamak plasma on its inner major radius side is shown to be strongly beneficial for achieving high-β stability against ballooning modes. With use of a set of reasonable equilibrium profiles, it is found that moderate indentation provides accessibility to the second region of stability. Ohmic equilibrium configurations which exhibit the second stability region have not yet been found.

11255 Energetic particle stabilization of ballooning modes in tokamaks. Rosenbluth, M.N.; Tsai, S.T.; Van Dam, J.W.; Engquist, M.G. (Institute for Fusion Studies, University of Texas, Austin, Texas 78712). *Physical Review Letters;* **51**: No. 21, 1967-1970(21 Nov 1983). Contract FG05-80ET53088.

Introduction of an anisotropic, highly energetic trapped-particle species into a tokamak may allow direct stable access to the high-beta regime of second stability. Under certain conditions, the mode at marginal stability acquires a real frequency close to the precessional drift frequency of the energetic particles, perhaps correlating with recent "fishbone" observations on PDX.

11256 Heating of plasma ions in a tokamak by the second-harmonic ion-cyclotron resonance interaction with radio-frequency waves. Hwang, D.Q.; Hosea, J.; Thompson, H.; Wilson, J.R.; Davis, S.; Herndon, D.; Kaita, R.; Mueller, D.; Suckewer, S.; Daughney, C. (Plasma Physics Laboratory, Princeton University, Princeton, New Jersey 08544). *Physical Review Letters;* **51**: No. 20, 1865-1868(14 Nov 1983). Contract AC02-76CH03073.

The radio-frequency-wave heating of ions in a tokamak plasma employing the second-harmonic ion-cyclotron resonance interaction has been demonstrated in recent high-power (3-MW) experiments on the Princeton Large Torus tokamak.

11257 ZAPP: An inexpensive versatile x-ray source. Dietrich, D.D.; Fortner, R.J.; Price, D.F.; Stewart, R.E. (Lawrence Livermore National Laboratory, Livermore, California 94550). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1366-1368(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

The Z-pinch atomic physics project (ZAPP) in E-Division at the Lawrence Livermore Laboratory has been established to study the physics of high temperature high density plasmas. Using a linear hollow gas puff or a cylindrical wire array the authors can obtain electron temperatures in the keV region and densities of 10^{20} - 10^{22}/cm^3 for virtually any element or mixtures of elements. At the center of this project is a 100 kV, 55 kJ capacitor bank which discharges through low inductance switches and transmission lines into the load developing peak currents in the 2.5 x 10^6 amp range. One of the authors' goals is to have all major diagnostics temporally and spatially resolved. Included in this list are pinhole photography, grazing incidence and bent crystal spectroscopy, laser interferometry and holography, and pulsed laser scattering. The authors have also implemented an array of PIN diodes, XRD detectors and Rogowski coils. With a clean, repeatable, well diagnosed plasma, they can address a wealth of questions concerning both plasma and atomic physics. The main experimental emphasis centers on the investigation of plasma properties such as line broadening and shifting of spectral lines and in general testing the ability of existing codes to predict observed spectra of both lines and continuum radiation. Other plasma properties to be studied are the formation of hot spots and the production of stabilized plasmas. Atomic physics experiments include the study of radiative and relativistic effects in highly stripped heavy ions, radiation transport phenomena, collisional excitation rates and level populations to test inversion schemes.

11258 Contributions to fusion research from studies of foil-excited heavy ion beams. Johnson, B.M.; Gregory, D.C.; Jones, K.W. (Brookhaven National Laboratory, Upton, NY 11973). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1350-1353(Apr 1981). (CONF-801111—). Contract AC02-76CH00016.

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

XUV spectra in the wavelength region from 5-55 nm have been measured at Brookhaven National Laboratory for foil-excited ion beams of Au, W, Zr, Mo, Fe, and Ti. These atoms are of particular interest in fusion research. In sharp contrast to the wide-ranging timedependent charge state evolution of heavy ions in a plasma discharge, foil excitation of a heavy ion beam produces relatively well-defined narrow charge-state distributions. Existing accelerators, such as the Brookhaven MP tandems, can produce sufficiently energetic heavy ion beams to span the range of charge states found in present-day tokamaks. The comparison of spectra from beam-foil excitation and tokamak plasmas can therefore be used to infer the average ion and charge state makeup of the plasma discharge. Such comparisons with Au, W, and Mo features in tokamak spectra are discussed and spectra for Zr and Fe (which are expected contaminants in new tokamaks) are presented. Additional contributions to fusion research from beam-foil experiments are demonstrated. These include: wavelengths and identifications for lines which can be resolved in plasma spectra and direct determinations of radiative lifetimes and absorption oscillator strengths for these transitions which are used to determine impurity concentrations in plasmas.

11259 Plasma confinement. A study of plasma equilibria in axisymmetric devices. Couper, T.A. Oxford, England; Oxford University (1981). 188p. Available from British Library, Boston Spa, Wetherby, West Yorks. No. D45019/83.

This thesis is concerned with the construction of analytic solutions of the Grad-Shafranov (G-S) equation, which itself is the cornerstone of axisymmetric MHD equilibrium theory.

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REFER ALSO TO CITATION(S) 10219, 10221, 10222, 10227, 10229, 10232, 10266, 10266, 10267, 10268, 10282, 10283, 11248

11260 (ANL/FPP—83-1-Vol.1) Blanket comparison and selection study. Volume I. (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 458p. NTIS, PC A20/MF A01. Order Number DE84003657.

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The objectives of the Blanket Comparison and Selection Study (BCSS) can be stated as follows: (1) Define a small number (~ 3) of blanket design concepts that should be the focus of the blanket R and D program. A design concept is defined by the selection of all materials (e.g., breeder, coolant, structure and multiplier) and other major characteristics that significantly influence the R and D requirements. (2) Identify and prioritize the critical issues for the leading blanket concepts. (3) Provide the technical input necessary to develop a blanket R and D program plan. Guidelines for prioritizing the R and D requirements include: (a) critical feasibility issues for the leading blanket concepts will receive the highest priority, and (b) for equally important feasibility issues, higher R and D priority will be given to those that require minimum cost and short time.

11261 **(ANL/FPP—83-1-Vol.2) Blanket comparison and selection study. Volume II.** (Argonne National Lab., IL (USA)). Oct 1983. Contract W-31-109-ENG-38. 487p. NTIS, PC A21/MF A01. Order Number DE84003656.

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This volume contains extensive data for the following chapters: (1) solid breeder tritium recovery, (2) solid breeder blanket designs, (3) alternate blanket concept screening, and (4) safety analysis. The following appendices are also included: (1) blanket design guidelines, (2) power conversion systems, (3) helium-cooled, vanadium alloy structure blanket design, (4) high wall loading study, and (5) molten salt safety studies. (MOW)

11262 **(CONF-820948—14) Development of an ion source for long-pulse (30-s) neutral beam injection.** Menon, M.M.; Barber, G.C.; Blue, C.W.; Dagenhart, W.K.; Gardner, W.L.; Haselton, H.H.; Moeller, J.A.; Ponte, N.S.; Ryan, P.M.; Schecter, D.E. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004460.

From 12. symposium on fusion technology; Juelich, F.R. Germany (13 Sep 1982).

This paper describes the development of a long-pulse positive ion source that has been designed to provide high brightness deuterium beams (divergence $\simeq 0.25°$ rms, current density $\simeq 0.15$ A cm^{-2}) of 40 to 45 A, at a beam energy of 80 keV, for pulse lengths up to 30 s. The design and construction of the ion source components are described with particular emphasis placed on the long-pulse cathode assembly and ion accelerator.

11263 **(CONF-821108—35) Empirical scaling formulas for critical current and critical field for commercial NbTi.** Lubell, M.S. (Oak Ridge National Lab., TN (USA)). 1982. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE84004587.

From Applied superconductivity conference; Knoxville, TN, USA (30 Nov 1982).

This paper presents the results of an analysis of both published and unpublished critical current data given as a function of both field and temperature. Simple formulas have been obtained for (1) the critical temperature as a function of field that is needed to obtain an estimate of the current sharing temperature and hence temperature margin, (2) the critical current density for constant temperature as a function of field, and (3) the critical current density for constant field as a function of temperature.

11264 **(CONF-830795—8) DCT-8 pumped limiter design considerations.** Fuller, G.M.; Cramer, B.A.; Haines, J.R. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE84004446.

From Symposium on energy removal and particle control and toroidal fusion devices; Princeton, NJ, USA (26 Jul 1983).

Disruption erosion drives the life of the DCT-8 pumped limiter. This result came from an evaluation of beryllium (Be), beryllium oxide (BeO), and silicon carbide (SiC) as candidate surface tile materials. Beryllium oxide was selected as the reference tile materials. Beryllium oxide was selected as the reference tile material because it has the longest life: 13 full power hours (2300 burns at 20 s/burn) or 2.3 years of DCT-8 operation. The fabricability of any of the candidate materials and the ability to survive thermal shock conditions and electromagnetic loads imposed by distuptions are serious concerns. The most desirable materials from an engineering standpoint (graphite and high-Z, e.g., tantalum) were eliminated due to physical considerations.

11265 **(CONF-830942—78) Experience with Zr-Al getter pumps in the ISX-B tokamak.** Emerson, L.C.; Mioduszewski, P.K.; Simpkins, J.E. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004377.

From 3. topical meeting on fusion reactor materials; Albuquerque, NM, USA (19 Sep 1983).

Zr-Al getter pumps have been used in the ISX-B tokamak in connection with a series of pump limiter experiments. Experience with these pumps in this environment has revealed several problems that may limit their usefulness under typical tokamak operating conditions. Although the pumps perform satisfactorily while in operation with hydrogenic pumping speeds of 1-2 x 10^3 L/s at pressures of ~ 10 mtorr, some unknown mechanism, on occasion, slightly activates pumps that had been previously passive. Such behavior precludes the use of any operations that require high hydrogen pressures in the torus. Additionally, discharge cleaning operations cannot be safely carried out after the pumps are fully activated. Continued use of the pumps eventually leads to destruction of two getter cartridges from hydrogen embrittlement.

11266 **(CONF-831171—17) Design considerations for achieving high vacuum integrity in fusion devices.** Fuller, G.M.; Haines, J.R. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 35p. NTIS, PC A03/MF A01. Order Number DE84004684.

From American Vacuum Society meeting; Boston, MA, USA (1 Nov 1983).

Achieving high vacuum integrity in fusion devices requires close attention to both the overall system configuration and the design details of joints and seals. This paper describes the factors in selecting the system configuration, from a vacuum standpoint, for the Princeton Plasma Physics Laboratory (PPPL) DCT-8 Tokamak device. The DCT-8 (driven current tokamak) is the eighth design in a series of tokamak concepts defined to cover the magnetic confinement and development gap between the Tokamak Fusion Test Reactor (TFTR) and the Engineering Test Reactor (ETR). Leak detection concept development is considered a vital activity, as well as the definition of a configuration that minimizes the consequences of leaks. A major part of the vacuum boundaries of the magnet system and the plasma system is common. For the major penetrations, primary and secondary seals are provided with vacuum control over the region between seals. The intent is to instrument these cavities and provide automated recordings of these measurements for leak maintenance.

11267 **(CONF-831180—8) 2D accelerator design for SITEX negative ion source.** Whealton, J.H.; Raridon, R.J.; McGaffey, R.W.; McCollough, D.H.; Stirling, W.L.; Dagenhart, W.K. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 8p. NTIS, PC A02/MF A01. Order Number DE84003301.

From 3. international symposium on the production and neutralization of negative ions and beams; Upton, NY, USA (14 Nov 1983).

Solving the Poisson-Vlasov equations where the magnetic field, B, is assumed constant, we optimize the optical system of a SITEX negative ion source in infinite slot geometry. Algorithms designed to solve the above equations were modified to include the curved emitter boundary data appropriate to a negative ion source. Other configurations relevant to negative ion sources are examined.

11268 **(CONF-831203—39) Overcurrent protection device for neutral beam sources.** Praeg, W.F. (Argonne National Lab., IL (USA)). 1983. Contract W-31-109-ENG-38. 6p. NTIS, PC A02/MF A01. Order Number DE84004013.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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Electrical loads connected to capacitance elements in high voltage direct current systems are protected from damage caused by capacitance discharge overcurrents by connecting a longitudinal inductor between the capacitance element and the load. The inductor comprises a bifilar winding wound about a magnetic core, which forms an incomplete magnetic circuit. A diode is connected across a portion of the bifilar winding. Most of the energy discharged from the capacitance element is stored in the inductor and then dissipated, away from the load, in an L-R circuit comprising the diode and the coil winding. Multiple high voltage circuits having capacitance elements may be connected to loads through bifilar windings all wound about the aforementioned magnetic core.

11269 **(CONF-831203—56) Computer simulation of magnetic field circuits in ATF.** White, J.A.; Googe, J.M.; Nickels, L.E. (Oak Ridge National Lab., TN (USA); Nickels Engineering, Inc., New Berlin, WI (USA)). 1983. Contract W-7405-ENG-26. 3p. NTIS, PC A02/MF A01. Order Number DE84004583.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The proposed design of the Advanced Toroidal Facility (ATF) contains several closely coupled magnetic field circuits that are being modeled using the SUPER*SCEPTRE computer program in order to predict their transient behavior. The results of this transient analysis study will be used to determine component values and/or special precautions that may be required for power supply and other circuit element protection due to the mutual coupling between circuits. ATF is a continuous-coil torsatron device using resistive coils in a pulsed mode of operation in which a current fluctuation in one coil induces voltages in the other circuit element protection due to the mutual coupling between circuits. ATF is a continuous-coil torsatron device using resistive coils in a pulsed mode of operation in which a current fluctuation in one coil induces voltages in the other circuit that may not be desirable. The model contains the solid-state power supplies' equivalent circuits, the resistance and self-inductance of each magnetic field coil, and the mutual inductances of every coil combination. The SUPER*SCEPTRE program allows for the direct input of all electrical components as well as the mutual inductances. The power supply voltages are entered as preprogrammed wave shapes designed to achieve the desired magnetic field strengths. The outputs of this program are tables and plots of voltages and currents associated with each circuit component.

11270 **(CONF-831203—57) National RF Test Facility as a multipurpose development tool.** McManamy, T.J.; Becraft, W.R.; Berry, L.A.; Blue, C.W.; Gardner, W.L.; Haselton, H.H.; Hoffman, D.J.; Loring, C.M. Jr.; Moeller, F.A.; Ponte, N.S. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE84004577.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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Additions and modifications to the National RF Test Facility design have been made that (1) focus its use for technology development for future large systems in the ion cyclotron range of frequencies (ICRF), (2) expand its applicability to technology development in the electron cyclotron range of frequencies (ECRF) at 60 GHz, (3) provide a facility for ELMO Bumpy Torus (EBT) 60-GHz ring physics studies, and (4) permit engineering studies of steady-state plasma systems, including superconducting magnet performance, vacuum vessel heat flux removal, and microwave protection. The facility will continue to function as a test bed for generic technology developments for ICRF and the lower hybrid range of frequencies (LHRF). The upgraded facility is also suitable for mirror halo physics experiments.

11271 **(CONF-831203—58) Characteristics of a long-pulse (30-s), high-power (4-MW) ion source for neutral beam injection.** Menon, M.M.; Barber, G.C.; Combs, S.K.; Dagenhart, W.K.; Gardner, W.L.; Haselton, H.H.; Moeller, J.A.; Ponte, N.S.; Ryan, P.M.; Schechter, D.E. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004681.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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A quasi-steady-state ion source has been developed for neutral beam injection applications. It is of the duoPIGatron type designed for delivering 50 A of hydrogen ions at 80 keV for 30-s-long pulses. Ion beams of 40 A at 75 keV were extracted for pulse lengths up to 30 s, maintaining excellent optical quality in the beam for the entire pulse duration. The design features and operational characteristics of the ion source are elaborated.

11272 **(CONF-831203—59) Parametric system studies of candidate TF coil system options for the Tokamak Fusion Core Experiment (TFCX).** Reiersen, W.T.; Flanagan, C.A.; Miller, J.B. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004783.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

System studies were performed to determine the sensitivity of hybrid and superconducting toroidal field (TF) coil system options to maximum field at the TF coil and to field enhancement due to resistive insert coils. The studies were performed using Tokamak Fusion Core Experiment (TFCX) design assumptions, guidelines, and criteria and involved iterative execution of the Fusion Engineering Design Center (FEDC) systems code, magnetohydrodynamics (MHD) equilibrium code, and EFFI (a code to evaluate magnetic field strength). The results indicate that for TFCX with no minimum wall loading specified, a design point chosen solely on the basis of cost would likely be in the low-field region of design space where the cost advantage of hybrids is least apparent. However, as the desired neutron wall loading increases, the hybrid option suggests an increasing cost advantage over the all-superconducting option; this cost advantage is countered by increased complexity in design - particularly in assembly and maintenance.

11273 **(CONF-831203—60-Draft) Thermal shock considerations for the TFCX limiter and first wall.** Haines, J.R.; Fuller, G.M. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 15p. NTIS, PC A02/MF A01. Order Number DE84004420.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

Resistance to thermal shock fracture of limiter and first wall surface material candidates during plasma disruption heating conditions is evaluated. A simple, figure-of-merit type thermal shock parameter which provides a mechanism to rank material candidates is derived. Combining this figure-of-merit parameter with the parameters defining specific heating conditions yields a non-dimensional thermal shock parameter. For values of this parameter below a critical value, a given material is expected to undergo thermal shock damage. Prediction of thermal shock damage with this parameter is shown to exhibit good agreement with test data. Applying this critical parameter value approach, all materials examined in this study are expected to experience thermal shock damage for nominal TFCX plasma disruption conditions. Since the extent of this damage is not clear, tests which explore the range of expected conditions for TFCX are recommended.

11274 **(CONF-831203—62) Design of the coolant system for the Large Coil Test Facility pulse coils.** Bridgman, C.; Ryan, T.L. (Grumman Aerospace Corp., Bethpage, NY (USA); Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.). 1983. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE84004440.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

The pulse coils will be a part of the Large Coil Test Facility in Oak Ridge, Tennessee, which is designed to test six large tokamak-type superconducting coils. The pulse coil set consists of two resistive coaxial solenoid coils, mounted so that their magnetic axis is perpendicular to the toroidal field lines of the test coil. The pulse coils provide transient vertical fields at test coil locations to simulate the pulsed vertical fields present in tokamak devices. The pulse coils are designed to be pulsed for 30 s every 150 s, which results in a Joule heating of 116 kW per coil. In order to provide this capabil-

ity, the pulse coil coolant system is required to deliver 6.3 L/s (100 gpm) of subcooled liquid nitrogen at 10-atm absolute pressure. The coolant system can also cool down each pulse coil from room temperature to liquid nitrogen temperature. This paper provides details of the pumping and heat exchange equipment designed for the coolant system and of the associated instrumentation and controls.

11275 **(CONF-831203—67) Quality assurance aspects of the major procurements for the Large Coil Test Facility.** Taylor, D.J.; Thompson, P.B.; Ryan, T.L.; Queen, C.C.; Halstead, E.L.; Murphy, J.L.; Wood, R.J. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 6p. NTIS, PC A02/MF A01. Order Number DE84004588.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

The Large Coil Test Facility (LCTF) project is comprised of the test stand, supporting cryogenic systems, instrumentation, data acquisition, and utilities necessary for testing the large superconducting coils of the Large Coil Program (LCP). A significant portion of the facility hardware has been obtained through procurement actions with industrial suppliers. This paper addresses the project's experience in formulation and execution of quality assurance (QA) actions relative to several of the major items procured. Project quality assurance planning and specific features related to procurement activities for several of the more specialized test facility components are described. These component procurements include: (1) the coil test stand's major structural item (the bucking post) purchased from foreign industry; (2) fabrication and testing of high-current power supplies; (3) industrial fabrication of specialized instrumentation (voltage-tap signal conditioning modules); and (4) fabrication, installation, and testing of the liquid helium piping system.

11276 **(CONF-831203—68) Design description of the helical field coils for the Advanced Toroidal Facility.** Cole, M.J.; Thompson, P.B.; Jernigan, T.C.; Nelson, B.E.; Vinyard, L.M.; Johnson, R.L.; Williamson, D.E. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 5p. NTIS, PC A02/MF A01. Order Number DE84004545.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The Helical Field (HF) Coils for the Advanced Toroidal Facility will consist of two coils, which wrap around the plasma six times. The major radius of the coils will be 2.1 m with a minor radius of 45.75 cm to the coil current center. The coils will be positioned at assembly to within a 2 mm diameter around the winding law, Theta = 1/6 Phi. The coils will be fabricated as a set of 24 identical segments, 12 upper segments and 12 lower segments. These segments will be joined into continuous coils at the installation site by means of field assembled joints at the horizontal centerline of the machine. One special joint on each coil will contain the coil leads. The HF coils will consist of 14 copper turns and a structural member of stainless steel which has a cross section in the shape of a T. These pieces will be fabricated in accordance with the winding law Theta = 1/6 Phi. The copper turns will be water cooled and formed from CDA 101 or 102 copper. The 14 copper turns will be positioned such that 7 turns will be placed on each side of the structural tee. The structural tee will be fabricated from 44.45 mm thick stainless steel with a minimum yield strength of 205 MPa and a tensile strength of 485 MPa.

11277 **(CONF-831203—72) Diagnostic techniques for measuring temperature transients and stress transients in the first wall of an ICF reactor.** Melamed, N.T.; Taylor, L.H. (Westinghouse Research and Development Center, Pittsburgh, PA (USA)). 1983. Contract AC08-81DP40146. 31p. NTIS, PC A03/MF A01. Order Number DE84004687.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

The primary challenge in the design of an Inertial Confinement Fusion (ICF) power reactor is to make the first wall survive the frequent explosions of the pellets. Westinghouse has proposed a dry wall design consisting of steel tubes coated with tantalum. This report describes the design of a test chamber and two diagnostic procedures for experimentally determining the reliability of the Westinghouse design. The test chamber simulates the x-ray and ion pulse irradiation of the wall due to a pellet explosion. The diagnostics consist of remote temperature sensing and surface deformation measurements. The chamber and diagnostics can also be used to test other first-wall designs.

11278 **(CONF-831203—73-Draft) Reactor assessments of advanced bumpy torus configurations.** Uckan, N.A.; Owen, L.W.; Spong, D.A.; Miller, R.L.; Ard, W.B.; Pipkins, J.F.; Schmitt, R.J. (Oak Ridge National Lab., TN (USA); Applied Microwave Plasma Concepts, Inc., Encinitas, CA (USA); McDonnell Douglas Astronautics Co., St. Louis, MO (USA)). 1983. Contract W-7405-ENG-26. 33p. NTIS, PC A03/MF A01. Order Number DE84004644.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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Recently, several configurational approaches and concept improvement schemes were introduced for enhancing the performance of the basic ELMO Bumpy Torus (EBT) concept and for improving its reactor potential. These configurations include planar racetrack and square geometries, Andreoletti coil systems, and bumpy torus-stellarator hybrids (which include twisted racetrack and helical axis stellarator-snakey torus). Preliminary evaluations of reactor implications of each of these configurations have been carried out based on magnetics (vacuum) calculations, transport and scaling relationships, and stability properties. Results indicate favorable reactor projections with a significant reduction in reactor physical size as compared to conventional EBT reactor designs carried out in the past.

11279 **(CONF-831257—1) Infrared monitoring of gyrotron windows.** Huey, H.; Lopez, N.; Hu, G.; Choi, E.; Mundie, L.;. (Varian Associates, Inc., Palo Alto, CA (USA)). 1983. Contract W-7405-ENG-26. 10p. NTIS, PC A02/MF A01. Order Number DE84004442.

From IEEE meeting; Washington, DC, USA (5 Dec 1983).

A technique for monitoring the gyrotron output window surface temperature with an infrared camera while the gyrotron is in operation has been developed. The IR camera views the window through a perforated waveguide wall, and serves both as a guide for the safe operation at high average power of the tube, as well as an aid in the analysis of new window designs. Window temperatures were studied as a function of a number of parameters, including gun anode voltage, beam current, magnetic field, coolant flow, and load matching. The IR technique is applicable to many types of high average power microwave and millimeter wave tubes. Successful operation of the Varian 60 GHz gyrotron to 214 kW CW was guided by the infrared camera. Analyses on 28, 56 and 60 GHz gyrotrons have led to a number of design changes. A comparison with computer calculations is also presented.

11280 **(CONF-8311111—2-Draft) Technological requisites of the magnetic fusion energy programme.** Cooper, W.A. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 18p. NTIS, PC A02/MF A01. Order Number DE84004682.

From 2. inter-university energy symposium; Santiago, Chile (14 Nov 1983).

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An integral part of magnetic fusion energy research is the development of the technologies necessary for the confinement and heating of reactor-level plasmas. Heating systems based on energetic neutral beam particle injection or radio frequency waves (or both) will be required to heat plasmas to the temperatures at which fusion is self-sustaining. These systems may be used also to drive plasma currents. The magnet systems required to confine reactor-sized plasmas rely on the development of effective superconductors. Issues associated with safety and tritium handling concerns become important considerations in designing reactor concepts.

11281 **(CONF-8311111—3) Status of the Magnetic Fusion Energy Programme.** Cooper, W.A. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 21p. NTIS, PC A02/MF A01. Order Number DE84004683.

From 2. inter-university energy symposium; Santiago, Chile (14 Nov 1983).

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Fusion reactor level plasma parameters have been achieved in experimental devices during the last decade. Energy breakeven is expected in the larger plasma confinement devices that have recently begun or are about to begin operation with the goal of demonstrating that magnetic fusion systems are scientifically feasible. The present status of research in torodial and mirror systems is reviewed. Specifically, the Tokamak, Stellarator, and Mirror Programmes are described, with a concentration on the important physics issues (heating, confinement, stability, potential formation, etc.) these programmes address. Reactor designs are undertaken to identify and address issues associated with the engineering and economic feasibility of magnetic fusion as a power source. The first generation reactors will be based on the DT fuel cycle and have electricity, fissile fuel, and high temperature heat production as design goals.

11282 **(DOE/DP/40157—1) Gas filled dynamics for laser driven fusion reactors. Final report, August 4, 1981-December 31, 1983.** Moses, G.A.; McCarville, T.J.; Peterson, R.R. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering). Oct 1983. Contract AS08-81DP40157. 134p. (UWFDM—458). NTIS, PC A07/MF A01. Order Number DE84005181.

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This report serves as documentation for the MF-FIRE computer code. This code is the same as the FIRE code described in University of Wisconsin Fusion Engineering Program Report UWFDM-407 except that a multifrequency flux limited diffusion radiative transfer option has been added. Hence this report is a reproduction of UWFDM-407 with the additional description of the multifrequency radiative transfer.

11283 **(DOE/ER—0113/2) Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.** (USDOE Office of Energy Research, Washington, DC. Development and Technology Div.). Oct 1983. 136p. NTIS, PC A07/MF A01. Order Number DE84001531.

Separate abstracts were prepared for each of the 10 included sections. (MOW)

11284 (DOE/ER—0113/2, pp 39-42) **TRIO-01 experiment.** Clemmer, R.G. (Argonne National Lab., IL); Malecha, R.F.; Finn, P.A.; Misra, B.; Dudley, I.T.; Dyer, F.F.; Clemmer, E.D. Oct 1983. NTIS, PC A07/MF A01.

In Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report.

The objective of this work is to evaluate the potential of solid lithium ceramic materials as tritium breeding materials for D-T fusion reactors. This activity includes: (1) experimental studies on candidate solid breeder materials with regard to key chemical and physical properties and tritium release characteristics and (2) analysis and review of physiochemical and mechaniccal properties data to determine system operating limits.

11285 **(DOE/ER/53091—T9) Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Technical progress report.** Coggiola, M.J.; Peterson, J.R. (SRI International, Menlo Park, CA (USA)). 4 Jan 1983. Contract AT03-80ER53091. 32p. NTIS, PC A03/MF A01. Order Number DE84005027.

Initially, this work was directed toward predicting the angular scattering in D^- beams produced from D^+ charge-transfer in alkali targets. However, the work has now been redirected to provide information on the mechanisms that govern the behavior of direct extraction D^- ion sources, with immediate emphasis on the very promising Ehlers-Leung source at Lawrence Berkeley National Laboratory. The controlling mechanisms in these sources and some aspects of their behavior are only vaguely understood, and this work is intended to answer many of these questions. Included in these are problems related to both the surface production of negative ions and electrons, as well as processes within the source plasma region that determine the characteristics of the ions and neutrals that bombard the converter surface.

11286 **(DOE/ER/53091—T10) Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Progress report No. 16 for quarter ending December 31, 1983.** Coggiola, M.J.; Peterson, J.R. (SRI International, Menlo Park, CA (USA)). 4 Jan 1984. Contract AT03-80ER53091. 11p. NTIS, PC A02/MF A01. Order Number DE84004674.

We have begun a systematic study of H^-/D^- ion production from low-work function metal surfaces. Initial experiments are focussing on low energy (50 to 500 ev) H/sub i/$^+$/D/sub i/$^+$ (i=1-3) impact on both clean polycrystalline Mo and minimum work-function Mo/Cs surfaces. A new, ultra-high vacuum ion-surface scattering apparatus has been constructed for this work, and is described here. Preliminary results are presented for the measured secondary electron yields from low energy He^+, Ar^+, H^+, H_2^+, H_3^+, and Cs^+ impact on polycrystalline molybdenum between 50 eV and 1500 eV.

11287 **(EGG-M—10583) Accidental tritium release from solid breeding blankets.** Holland, D.F.; Merrill, B.J. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 6p. (CONF-831203—49). NTIS, PC A02/MF A01. Order Number DE84004229.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

Vulnerability of tritium in a solid breeding material has been determined for accidents involving failure of the barrier between the blanket and reactor building. Two breeding materials were analyzed, lithium aluminate and lithium oxide. Accident scenarios included either continuation or termination of the blanket cooling and helium purge flow. The results showed that with the purge flow continued, tritium in lithium oxide is more vulnerable than in lithium aluminate. As the blanket cools after reactor shutdown, tritium is desorbed from the lithium oxide because of its temperature dependent solubility. In addition, the diffusion rate in the solid remains high enough for tritium release, even at the temperatures after shutdown. With the purge flow terminated, the rate of tritium release is limited by diffusion along purge channels to the blanket boundary.

11288 **(EGG-M—10683) Risk assessment of computer-controlled safety systems for fusion reactors.** Fryer, M.O.; Bruske, S.Z. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 4p. (CONF-831203—74). NTIS, PC A02/MF A01. Order Number DE84005055.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

The complexity of fusion reactor systems and the need to display, analyze, and react promptly to large amounts of information during reactor operation will require a number of safety systems in the fusion facilities to be computer controlled. Computer software, therefore, must be included in the reactor safety analyses. Unfortunately, the science of integrating computer software into safety analyses is in its infancy. Combined plant hardware and computer software systems are often treated by making simple assumptions about software performance. This method is not acceptable for assessing risks in the complex fusion systems, and a new technique for risk assessment of combined plant hardware and computer software systems has been developed. This technique is an extension of the traditional fault tree analysis and uses structured flow charts of the software in a manner analogous to wiring or piping diagrams of hardware. The software logic determines the form of much of the fault trees.

11289 **(EGG-M—23583) Development of target capsules for muon catalyzed fusion experiments.** Watts, K.D.; Jones, S.E.; Caffrey, A.J. (EG and G Idaho, Inc., Idaho Falls (USA)). 1983. Contract AC07-76ID01570. 6p. (CONF-831203—84). NTIS, PC A02/MF A01. Order Number DE84004540.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

A series of Muon Catalyzed Fusion experiments has been conducted at the Los Alamos Meson Physics Facility to determine how many fusion reactions one muon would catalyze under various temperature, pressure, contamination, and tritium concentration conditions. Target capsules to contain deuterium and tritium at ele-

vated temperatures and pressures were engineered for a maximum temperature of 540 K (512°F) and a maximum pressure of 103 MPa (15,000 psig). Experimental data collected with these capsules indicated that the number of fusion reactions per muon continued to increase with temperature up to the 540-K design limit. Theory had indicated that the reaction rate should peak at approximately 540 K, but this was not confirmed during the experiments. A second generation of capsules which have a maximum design temperature of 800 K (980°F) and a maximum design pressure of 103 MPa (15,000 psig) has now been engineered. These new capsules will be used to further study the muon catalysis rate versus deuterium-tritium mixture temperature.

11290 (EUR-CEA-FC—1184) Construction of force-free fields which have toroidal surfaces about a given surface. Bouligand, G. (Association Euratom-CEA, Centre d'Etudes Nucleaires de Fontenay-aux-Roses, 92 (France). Dept. de Recherches sur la Fusion Controlee). May 1983. 54p. (In French). NTIS (US Sales Only), PC A04/MF A01. Order Number DE84750336.

A study of two-fields (B vector, rotB vector) of conservative flux which admits a family of toroidal surfaces of parameter phi on a domain limited by a given surface S, suggests their construction by a Cauchy-Arzela method of step by step. Taking into account the Newcomb condition this method is consistent with force-free magnetic fields and with helical equilibria with scalar pressure. The method supposes that B vector is of class C^1. This construction makes use of the remarkable property of the field B vector to be the surface gradient of a generating multivalued function Q on a closed surface. Consequently, the initial surface will be given with its normal metric coefficient K; that is to say, B vector admits a family F of homotopic surfaces on a infinitesimal domain about S, an element of F. From this, the periodic part of Q is a solution of a Beltrami equation for the flux conservation of which numerical resolution is envisaged. The study of these fields is made in a biorthogonal system of coordinates. The coeffficients of the two fundamental metric forms of magnetic surfaces vary with phi and are interrelated by a sixth order differential system of equations which gives their variation.

11291 (GA-A—16844) Neutron streaming through diagnostic penetrations in a fusion reactor shield. Engholm, B.A.; Battaglia, J.M.; Baur, J.F. (GA Technologies, Inc., San Diego, CA (USA)). May 1983. Contract AT03-76ET51011. 80p. NTIS, PC A05/MF A01. Order Number DE84005323.

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Monte Carlo calculations of neutron fluxes were made for several types of diagnostic penetrations in a realistic fusion reactor shield, and the results compared with classical streaming theory. Calculations and theory agreed well in straight penetrations, but calculated neutron transport in penetrations with elbows was higher than predicted by theory.

11292 (GA-A—17010) Cavity launchers for ICRF. Chiu, S.C.; Parks, P.; Perkins, F.W.; Rawls, J.W. (GA Technologies, Inc., San Diego, CA (USA); Princeton Univ., NJ (USA)). Aug 1983. Contract AT03-76ET51011. 8p. (CONF-830210—21). NTIS, PC A02/MF A01. Order Number DE84004892.

From 5. topical conference on radio frequency plasma heating; Madison, WI, USA (21 Feb 1983).

A type of resonant coil cavity is analyzed as a launcher for ICRF. This approach offers the advantages of: (1) convenient and flexible sizing, (2) ease of operation and maintenance, and (3) high power handling capability. We present results for resonance conditions, mode structures, power handling capabilities, and sensitivity to variation in plasma parameters.

11293 (HEDL—7408) Comparison of activation in STARFIRE and MARS first-walls. Heinisch, H.L.; Mann, F.M. (Hanford Engineering Development Lab., Richland, WA (USA)). 1983. Contract AC06-76FF02170. 6p. NTIS, PC A02/MF A01. Order Number DE84004940.

Activation calculations were performed for elements in the MARS and STARFIRE first-wall positions. The seven elements considered (N, Al, Ni, Mo, Cu, Nb, Pb) are these which were found from earlier STARFIRE calculations to require restrictions in order to meet NRC disposal regulations. The importance of the neutron spectrum is demonstrated by a comparison of MARS and STARFIRE results. In the harder spectrum of the MARS first-wall the same elements face restrictions, but for Ni, Mo and Nb the allowable limits are two to five times larger than in STARFIRE.

11294 (HEDL-SA—2925-FP) Development of a large lithium coolant system for operation under vacuum. Kolowith, R.; Schwartz, K.E.; Meadows, G.E.; Berg, J.D. (Hanford Engineering Development Lab., Richland, WA (USA)). Nov 1983. Contract AC06-76FF02170. 7p. (CONF-831203—52). NTIS, PC A02/MF A01. Order Number DE84004825.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

Argon and vacuum systems for the Experimental Lithium System (ELS) were tested to demonstrate vacuum-break capability, vacuum pumping performance, and vacuum sensor compatibility with a hostile liquid metal vapor/aerosol environment. Mechanical, diffusion and cryogenic vacuum pumps were evaluated. High-vacuum levels in the 10^{-3} Pa range were achieved over a 270°C flowing lithium system. Ionization, thermal conductivity, capacitance manometer, and compound-type pressure sensors were evaluated to determine the effects of this potentially deleterious environment. Screening elbows were evaluated as pressure sensor protective devices. A dual-purpose vacuum-level/nitrogen partial-pressure sensor was evaluated as a means of detecting air in-leakage. Several types of static mechanical vacuum seals were also evaluated. Measurements of the vapor/aerosol generation were made at several system locations and operating conditions.

11295 (IAE—3535/6) Effect of a field structure on the particle behaviour in magnetic traps. Orthogonality condition. Panov, D.A. (Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii). 1982. 28p. (In Russian). NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704455.

Non-contribution to and splitting of charged particle drift surfaces in a field of the general type are shown to be specified by the violation of the mutual orthogonality of lines B = const (where B the magnetic field modulus) and the field force lines on the magnetic surfaces. Attention is drawn to the impossibility of aligning the electron- and ion drift shells in the magnetic configurations with the non-orthogonal geometry of the field. The drift shells splitting is shown to be accompanied by generation of a magnetic field lateral to the vacuum field. The lateral field is comparable with the diamagnetic field in the order of magnitude. The field orthogonality condition, invariant with regard to selecting co-ordinates, is obtained, with the differentiation being performed along the directions of a force line and a line binormal to it. The structure of averaged and split drift surfaces with violation of the field geometry orthogonality is studied for a final anisotropic plasma pressure, the latter being considered as preset and satisfying the equilibrium conditions. Some consequences of violation of the field geometry orthogonality are considered that affect the conditions of the plasma MHD-equilibrium and maintaining its quasi-neutrality.

11296 (INIS-mf—8473, pp 106-112) Varennes Tokamak. Cumyn, P.B. (Canatom Ltd., Montreal, Quebec (Canada)). [nd]. NTIS (US Sales Only), PC A19/MF A01. (CONF-8106200—Pt.1).

From 21. annual international conference of Canadian Nuclear Association and 2. annual conference of Canadian Nuclear Society; Ottawa, Canada (8 Jun 1981).

A consortium of five organizations under the leadership of IREQ, the Institute de Recherche d'Hydro-Quebec has completed a conceptual design study for a tokamak device, and in January 1981 its construction was authorized with funding being provided principally by Hydro-Quebec and the National Research Council, as well as by the Ministre d'Education du Quebec and Natural Sciences and Engineering Research Council of Canada (NSERC). The device will form the focus of Canada's magnetic-fusion program and will be located in IREQ's laboratories in Varennes. Presently the machine layout is being finalized from the physics point of view

and work has started on equipment design and specification. The Tokamak de Varennes will be an experimental device, the purpose of which is to study plasma and other fusion related phenomena. In particular it will study: 1. Plasma impurities and plasma/liner interaction; 2. Long pulse or quasi-continuous operation using plasma rampdown and eventually plasma current reversal in order to maintain the plasma; and 3. Advanced diagnostics.

11297 (INIS-mf—8663, pp 9) **Rotamak approach to compact torus research.** Jones, I.R. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11298 (INIS-mf—8663, pp 10) **Results from the high-power, short duration Rotamak III experiment.** Durance, G. (Flinders Univ. of South Australia, Bedford Park. School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11299 (INIS-mf—8663, pp 11) **Tokamak - progress, problems and prospects.** Brennan, M.H. (Sydney Univ. (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11300 (INIS-mf—8663, pp 94) **Linear tokamak-like experiment.** Bydder, E.L.; Liley, B.S. (Waikato Univ., Hamilton (New Zealand)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11301 (INIS-mf—8663, pp 28) **Exploiting the plasma for power production: feeding and breeding and energy-harvesting.** Ford, G.W.K. (Australian Atomic Energy Commission Research Establishment, Lucas Heights). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11302 (INIS-mf—8663, pp 32) **Review of inertial confinement fusion.** Luther-Davies, B. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11303 (INIS-mf—8663, pp 33) **Density profiles of plasmas produced by high intensity laser radiation.** Dragila, R. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11304 (INIS-mf—8663, pp 34) **Stimulated Raman scattering from a laser-produced plasma.** Nugent, K.A. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11305 (INIS-mf—8663, pp 35) **Evaluation of alpha spectra from laser fusion pellets.** Hora, H.; Tubbenhauer, G.; Cicchitelli, L.; Jones, D.A. (New South Wales Univ., Kensington (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11306 (INIS-mf—8663, pp 36) **Nuclear spin polarization for gain increase at inertial confinement.** Hora, H.; Cicchitelli, L. (New South Wales Univ., Kensington (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11307 (INIS-mf—8663, pp 37) **Stellarators - current status and future plans.** Hamberger, S.M. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11308 (INIS-mf—8663, pp 76) **Ion probe measurements from laser-produced plasmas.** Tallents, G.J. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11309 (INIS-mf—8663, pp 77) **X-ray emission from a laser-produced plasma.** Nugent, K.A.; Perry, A. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11310 (INIS-mf—8663, pp 78) **Harmonic emission from laser-produced plasmas.** Burgess, M.D.J. (Australian National Univ., Canberra. Research School of Physical Sciences). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11311 (INIS-mf—8663, pp 81) **Explanation of reduced thermal conduction in (laser) nonlinear force steepened density profiles by a two-fluid damping mechanism.** Jones, D.A.; Hora, H. (New South Wales Univ., Kensington (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11312 (INIS-mf—8663, pp 82) **Electrostatic fields in laser produced plasmas.** Lalousis, P.; Hora, H.; Jones, D.A. (New South Wales Univ., Kensington (Australia). Dept. of Theoretical Physics). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11313 (INIS-mf—8663, pp 83) **Comeback of beam-fusion with gains ready for the hybrid reactor.** Hora, H.; Goldsworthy, M.; Jones, D.A.; Kemeny, L. (New South Wales Univ., Kensington (Australia)). Feb 1983. NTIS (US Sales Only), PC A06/MF A01. (CONF-830237—Absts.).

From 14. AINSE plasma physics conference; Lucas Heights, Australia (7 Feb 1983).

11314 (KFKI—1983-12) Self-focusing of laser beam crossing a laser plasma. Bakos, J.S.; Foeldes, I.B.; Ignacz, P.N.; Soerlei, Zs. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). Mar 1983. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704456.

A crossed-beam experiment was performed to clarify the mechanism of self-focusing in a laser produced spark. The plasma was created by one beam and self-focusing was observed in the weak probe beam which crossed the plasma. Experimental results show that the cause of self-focusing is the nonuniform heating mechanism.

11315 (KFKI—1983-50) Self-focusing in laser produced spark. Bakos, J.S.; Foeldes, I.B. (Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics). May 1983. 14p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704457.

The self-focusing effect appearing in different phases of development of laser produced breakdown plasma in air is investigated. Self-focusing during the ionization process is demonstrated. Thermal self-focusing was observed in the later stage of the plasma development at moderate light intensities. Plasma development was investigated by forward and side scattering of the laser light in the plasma. A crossed beam experiment gave evidence of the thermal mechanism of self-focusing.

11316 (LA-UR—83-2691) Magnetic field topologies of the relaxed states of turbulent discharges. Turner, L. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 19p. (CONF-8310229—3). NTIS, PC A02/MF A01. Order Number DE84004330.

From Chapman conference on magnetic reconnection; Los Alamos, NM, USA (3 Oct 1983).

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The equation of zero-beta, hydromagnetic equilibrium: del x B = lambda B, which has long been of interest to astrophysicists, has recently become of interest to fusion physicists as a result of its ability to describe the gross features of the magnetic field configurations of finite-beta reversed-field-pinch and spheromak discharges. Not only does the equation describe the state of minimum magnetic energy for a fixed magnetic flux and magnetic helicity, but also it describes the mean magnetic field of an absolute equilibrium ensemble with magnetic energy, magnetic helicity, and magnetic flux constraints. Because of its utility, we have recently solved it analytically for two cylindrically symmetric configurations: (1) a circular cylinder of radius r_0 and length L whose side and endplates are perfectly conducting, except for infinitesimal ports at the center of each endplate that permit a finite magnetic flux to enter and leave the cylinder's interior, and (2) a circular cylinder of radius r_0 and length L whose side and endplates are perfectly conducting, except for one endplate that has both an infinitesimal port at its center that permits magnetic flux to enter the cylinder's interior and a concentric, circular, infinitesimal slit of radius a that permits the flux to exit.

11317 (LA-UR—83-3470) Development of CO_2 and KrF gas lasers as drivers for inertial confinement fusion. Rockwood, S.D. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 16p. (CONF-831203—44). NTIS, PC A02/MF A01. Order Number DE84004329.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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Several different driver systems are currently under development in the national ICF program. Los Alamos has traditionally emphasized gas laser systems because of their intrinsic high average power capability and ease of operation. This paper will review the status of activities in both carbon dioxide (CO_2) and krypton fluoride (KrF) development at the Laboratory.

11318 (LA-UR—83-3476) Poloidal field system design for the ZT-H reversed field pinch experiment. Schoenberg, K.F.; Gribble, R.F.; Linton, T.W.; Reass, W.R. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-831203—43). NTIS, PC A02/MF A01. Order Number DE84004328.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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This report discusses each of the following areas: (1) equilibrium specification, (2) the equilibrium winding, (3) the magnetizing winding, (4) numerical poloidal field system analysis, (5) coil cross section, turns, minimum field error, (6) coil stresses and cooling, (7) the upper structure, (8) the loads, (9) boundary conditions and method of analysis, and (10) design description. (MOW)

11319 (LA-UR—83-3489) Toroidal magnetic field system for a 2-MA reversed-field pinch experiment. Melton, J.G.; Linton, T.W. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-831203—45). NTIS, PC A02/MF A01. Order Number DE84004322.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The engineering design of the toroidal magnetic field (TF) system for a 2-MA Reversed-Field Pinch experiment (ZT-H) is described. ZT-H is designed with major radius 2.15 meters, minor radius 0.40 meters, and a peak toroidal magnetic field of 0.85 Tesla. The requirement for highly uniform fields, with spatial ripple $<0.2\%$ leads to a design with 72 equally spaced circular TF coils, located at minor radius 0.6 meters, carrying a maximum current of 9.0 MA. The coils are driven by a 12-MJ capacitor bank which is allowed to ring in order to aid the reversal of magnetic field. A stress analysis is presented, based upon calculated hoop tension, centering force, and overturning moment, treating these as a combination of static loads and considering that the periodic nature of the loading causes little amplification. The load transfer of forces and moments is considered as a stress distribution resisted by the coils, support structures, wedges, and the structural shell.

11320 (LA-UR—83-3490) Electrical design of a high current density air-core reversed-field pinch ZTP. Reass, W.A.; Melton, J.G.; Gribble, R.F. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-831203—46). NTIS, PC A02/MF A01. Order Number DE84004321.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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This paper describes the electrical design of a small, high current density (10 MA/m^2) toroidal reversed-field Z-Pinch (RFP) presently being constructed at Los Alamos. Special purpose magnetic field programs were used to calculate self and mutual inductances for the poloidal field windings. The network analysis program MINI-SCEPTRE was then used to predict plasma current, including the interaction between toroidal and poloidal field circuits, as described by the Bessel function model for RFP's. Using these programs, coil geometry was obtained for minimal field errors and the pulse power systems were optimized to minimize equilibrium control power. Results of computer modeling and implementation of the electrical circuits are presented.

11321 (LA-UR—83-3505) Plasma engineering design of a compact reversed-field pinch reactor (CRFPR). Bathke, C.G.; Embrechts, M.J.; Hagenson, R.L.; Krakowski, R.A.; Miller, R.L. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 9p. (CONF-831203—47). NTIS, PC A02/MF A01. Order Number DE84004334.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The rationale for and the characteristics of the high-power-density Compact Reversed-Field Pinch Reactor (CRFPR) are discussed. Particular emphasis is given to key plasma engineering aspects of the conceptual design, including plasma operations, current drive, and impurity/ash control by means of pumped limiters or magnetic divertors. A brief description of the Fusion-Power-Core integration is given.

11322 **(LBL—16833) Formation of H^- by charge transfer in alkaline-earth vapors.** Schlachter, A.S.; Morgan, T.J. (Lawrence Berkeley Lab., CA (USA); Wesleyan Univ., Middletown, CT (USA)). Oct 1983. Contract AC03-76SF00098;AC02-76ET53048. 14p. (CONF-831180—15). NTIS, PC A02/MF A01. Order Number DE84004346.

From 3. international symposium on the production and neutralization of negative ions and beams; Upton, NY, USA (14 Nov 1983).

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Progress on the study of H^- formation by charge transfer in alkaline-earth vapors is reported. The H^- equilibrium yield in strontium vapor reaches a maximum of 50% at an energy of 250 eV/amu, which is the highest H^- yield reported to date.

11323 **(LBL—16903) H^- production from different metallic converter surfaces.** Leung, K.N.; Ehlers, K.W. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 10p. (CONF-831180—13). NTIS, PC A02/MF A01. Order Number DE84004345.

From 3. international symposium on the production and neutralization of negative ions and beams; Upton, NY, USA (14 Nov 1983).

The relative yield of H^- ions generated from various metallic surfaces (such as Mo, Ti, V, Nb, Pt, Pd, Rh, Cu, Ta, Al, Au and stainless steel) are compared in a multicusp source with and without the presence of cesium. Result of the investigation shows that one can optimize the H^- yield and formation process by choosing the proper converter material for a given range of source operating conditions.

11324 **(LBL—16939) Considerations involved in the design of negative-ion-based neutral beam systems.** Cooper, W.S. (Lawrence Berkeley Lab., CA (USA)). Nov 1983. Contract AC03-76SF00098. 13p. (CONF-831180—14). NTIS, PC A02/MF A01. Order Number DE84004241.

From 3. international symposium on the production and neutralization of negative ions and beams; Upton, NY, USA (14 Nov 1983).

We consider the requirements and constraints for negative-ion-based neutral beam injection systems, and show how these are reflected in design considerations. We will attempt to develop a set of guidelines for users and developers to use to see how well (in a qualitative sense, at least) a particular neutral beam system fits a particular proposed need.

11325 **(PFC/RR—83-08) Modeling of lithium and lithium-lead reactions in air using LITFIRE.** Gilberti, V.J.; Kazimi, M.S. (Massachusetts Inst. of Tech., Cambridge (USA)). Jan 1983. Contract AP07-79ID00019. 171p. NTIS, PC A08/MF A01. Order Number DE84004764.

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LITFIRE is a computer code that simulates the combustion of lithium in various containment schemes. The accuracy of LITFIRE in predicting thermal and pressure responses of containment atmosphere and structures has been tested against small scale (100 kg. Li) spills performed at the Hanford Engineering Development Laboratory. The agreement between experiment and LITFIRE prediction was within 10%. Application of LITFIRE to fires in a prototypical fusion reactor was made. The predictions of LITFIRE indicate that fires limited to the torus of a tokamak fusion reactor would be much less severe than fires resulting from spills directly onto the containment building floor. However, the primary wall and surrounding structures would become hotter in spills inside the torus because they are directly exposed to radiative heating by the fire.

11326 **(PPPL—2038) Analytic representation of three-dimensional stellarator field.** Yoshikawa, S. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Sep 1983. Contract AC02-76CH03073. 11p. (CONF-831105—6). NTIS, PC A02/MF A01. Order Number DE84000535.

From Meeting of the Plasma Physics Division of the American Physical Society; Los Angeles, CA, USA (7 Nov 1983).

The stellarator configuration can be greatly simplified when toroidal harmonics are introduced. The toroidal function satisfies Laplace's equation and together with toroidal field and vertical field, a small-aspect-ratio stellarator can be constructed with an aspect ratio as low as 3.6. This functional presentation suggests a very fast computation of particle orbits and magnetic configuration.

11327 **(PPPL—2051) TFTR initial operations.** Young, K.M.; Bell, M.; Blanchard, W.R.; Bretz, N.; Cecchi, J.; Coonrod, J.; Davis, S.; Dylla, H.F.; Efthimion, P.C.; Fonck, R. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Nov 1983. Contract AC02-76CH03073. 35p. NTIS, PC A03/MF A01. Order Number DE84004302.

The Tokamak Fusion Test Reactor (TFTR) has operated since December 1982 with ohmically heated plasmas. Routine operation with feedback control of plasma current, position, and density has been obtained for plasmas with I/sub p/ $\simeq$ 800 kA, a = 68 cm, R = 250 cm, and B/sub t/ = 27 kG. A maximum plasma current of 1 MA was achieved with q $\simeq$ 2.5. Energy confinement times of $\sim$ 150 msec were measured for hydrogen and deuterium plasmas with anti n/sub e/ $\simeq 2 \times 10^{13}$ cm^{-3}, T/sub e/ (0) $\simeq$ 1.5 keV, T/sub i/ (0) $\simeq$ 1.5 keV, and Z/sub eff/ $\simeq$ 3. The preliminary results suggest a size-cubed scaling from PLT and are consistent with Alcator C scaling where tau $\sim nR^2a$. Initial measurements of plasma disruption characteristics indicate current decay rates of $\sim$ 800 kA in 8 ms which is within the TFTR design requirement of 3 MA in 3 ms.

11328 **(PPPL—2062) Island formation and destruction of flux surfaces in three-dimensional MHD equilibria.** Reiman, A.H.; Boozer, A.H. (Princeton Univ., NJ (USA). Plasma Physics Lab.). Nov 1983. Contract AC02-76CH03073. 32p. NTIS, PC A03/MF A01. Order Number DE84004297.

We describe the physics involved in the appearance of islands due to resonant pressure driven currents in three-dimensional MHD equilibria. Estimates of island widths are obtained by an expansion in β. The theory is applied to Princeton's heliac reference design.

11329 **(SAAS—303) Techniques for radiation protection monitoring of personnel at fusion reactors.** Schuricht, V. (Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin (German Democratic Republic)). 1983. 18p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704327.

The radiation sources and fields likely to be encountered in future nuclear fusion plants are discussed in respect to the resulting requirements for personnel monitoring. Although large inventories of radioactive substances and very intensive neutron fields would be present in such plants, only some special aspects need to be observed in radiation monitoring measurements. Further development of fusion technology will presumably render possible a 'clean' energy production which does not require extensive radiation protection measures.

11330 **(SAI—83/1193) Tandem mirror coil optimization studies.** Francis, G.L.; D'Ippolito, D.A.; Myra, J.R. (Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.). Nov 1983. Contract AC03-76ET53057. 39p. NTIS, PC A03/MF A01. Order Number DE84005394.

A recently developed numerical algorithm for optimizing quadrupole magnetic coil systems is applied to the tandem mirror design problems. By adjusting filamentary coil shapes, the magnetic field structure minimizing radial particle transport is found, subject to a stability constraint. Two configurations are examined: a MARS-like reactor design and an unconventional TMX-like system with a non-axisymmetric central cell. In the latter case, a number of nearly omnigenous geometries with various stability properties are investigated.

11331 **(UCID—19948) Flow visualizations, velocity measurements, and surface convection measurements in simulated 20.8-cm Nova box amplifier cavities.** Julien, J.L.; Molishever, E.L. (Lawrence Livermore National Lab., CA (USA)). 31 Oct 1983. Contract W-7405-ENG-48. 75p. NTIS, PC A04/MF A01. Order Number DE84004354.

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Reported are fluid mechanics experiments performed in models of the 20.8-cm Nova amplifier lamp and disk cavities. Lamp cavity nitrogen flows are shown, by both flow visualization and velocity measurements, to be acceptably uniform and parallel to the flashlamps. In contrast, the nitrogen flows in the disk cavity are shown to be disordered. Even though disk cavity flows are disordered, the simplest of three proposed nitrogen introduction systems for the disk cavity was found to be acceptable based on convection measurements made at the surfaces of simulated laser disks.

11332 **(UCRL—15565) Seismic review of vault for MFTF upgrade project.** Franklin, H.A. (Lawrence Livermore National Lab., CA (USA)). 29 Sep 1983. Contract W-7405-ENG-48. 18p. NTIS, PC A02/MF A01. Order Number DE84004188.

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This letter report was prepared in accordance with the scope of work for the preconceptual seismic evaluation of the (α + T) Tandem Mirror Fusion Machine concrete vault. The scope of the work was developed with the assistance of the Bechtel site representative Dr. Sunil Ghose. The report contains comments and preconceptual recommendations on wall upgrading for an 150-ton crane installation, concrete vault seismic capability for (α + T) conditions, and recommendations for future work.

11333 **(UCRL—15571) Pressure drop considerations of a lithium cooled fusion breeder tokamak reactor blanket.** Wong, C.P.C. (Lawrence Livermore National Lab., CA (USA)). 6 Dec 1983. Contract W-7405-ENG-48. 13p. NTIS, PC A02/MF A01. Order Number DE84004805.

Liquid lithium was selected as one of the coolants for the 1983 fusion breeder blanket used on the magnetically confined tokamak fusion reactor, and as a result, the thermal-hydraulic calculations were dominated by magnetohydrodynamic (MHD) considerations. The applicable sets of MHD equations for the engineering thermal-hydraulic design were reviewed and compared. Special attention was given to the MHD calculations for the fertile material zone, a packed bed of composite beryllium and thorium balls, since this region can dominate the thermal-hydraulic behavior of this blanket module. To keep the pressure drops acceptable, fertile fuel balls were omitted in the inboard blanket.

11334 **(UCRL—89285) Calculation of density profiles in tandem mirrors fueled by pellets.** Campbell, R.B.; Gilmore, J.M. (Lawrence Livermore National Lab., CA (USA)). 2 Dec 1983. Contract W-7405-ENG-48. 7p. (CONF-831203—51). NTIS, PC A02/MF A01. Order Number DE84004079.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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We have modified the LLNL radial transport code TMT to model reactor regime plasmas, fueled by pellets. The source profiles arising from pellet fueling are obtained from existing pellet ablation models. Because inward radial diffusion due to inverted profiles must compete with trapping of central cell ions in the transition region for tandem mirrors, pellets must penetrate fairly far into the plasma. In fact, based on our radial calculations, a pellet with a velocity of 10 km/sec cannot sustain the central flux tubes; a velocity more like 100 km/sec will be necessary. We also find that the central cell radial diffusion must exceed classical by about a factor of 100.

11335 **(UCRL—89433) Volume generation of negative ions in high density hydrogen discharges.** Hiskes, J.R.; Karo, A.M. (Lawrence Livermore National Lab., CA (USA)). 1 Jul 1983. Contract W-7405-ENG-48. 5p. (CONF-830920—11). NTIS, PC A02/MF A01. Order Number DE84004793.

From 7. symposium on sources and ion assisted technology and 4. international conference on ion and plasma assisted techniques; Kyoto, Japan (12 Sep 1983).

A parametric survey is made of a high-density tandem two-chamber hydrogen negative ion system. The optimum extracted negative ion current densities are sensitive to the atom concentration in the discharge and to the system scale length. For scale lengths ranging from 10 cm to 0.1 cm optimum current densities range from of order 1 to 100 mA cm^{-2}, respectively.

11336 **(UCRL—89726) Generation of H^-, D^- ions on composite surfaces with application to surface/plasma ion source systems.** Hiskes, J.R.; Karo, A.M.; Wimmer, E.; Freeman, A.J.; Chubb, S.R. (Lawrence Livermore National Lab., CA (USA); Northwestern Univ., Evanston, IL (USA)). 19 Aug 1983. Contract W-7405-ENG-48. 23p. (CONF-831171—18). NTIS, PC A02/MF A01. Order Number DE84004814.

From American Vacuum Society meeting; Boston, MA, USA (1 Nov 1983).

We review some salient features of the experimental and theoretical data pertaining to hydrogen negative ion generation on minimum-work-function composite surfaces consisting of Cs/transition metal substrates. Cesium or hydrogen ion bombardment of a cesium-activated negatively-biased electrode exposed to a cesium-hydrogen discharge results in the release of hydrogen negative ions. These ions originate through desorbtion of hydrogen particles by incident cesium ions, desorbtion by incident hydrogen ions, and by backscattering of incident hydrogen. Each process is characterized by a specific energy and angular distribution. The calculation of ion formation in the crystal selvage region is discussed for different approximations to the surface potential. An ab initio, all-electron, local density functional model for the composite surface electronics is discussed.

11337 **(UCRL—89759) NOVA laser facility for inertial confinement fusion.** Simmons, W.W. (Lawrence Livermore National Lab., CA (USA)). 30 Nov 1983. Contract W-7405-ENG-48. 7p. (CONF-831203—71). NTIS, PC A02/MF A01. Order Number DE84004190.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

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The NOVA laser consists of ten beams, capable of concentrating 100 to 150 kJ of energy (in 3 ns) and 100 to 150 TW of power (in 100 ps) on experimental targets by 1985. NOVA will also be capable of frequency converting the fundamental laser wavelength (1.05 μm) to its second (0.525 μm) or third (0.35 μm) harmonic. This additional capability (80 to 120 kJ at 0.525 μm, 40 to 70 kJ at 0.35 μm) was approved by the US Department of Energy (DOE) in April 1982. These shorter wavelengths are much more favorable for ICF target physics. Current construction status of the NOVA facility, intended for completion in the autumn of 1984, will be presented.

11338 **(UCRL—89987) MFTF-B quasi-optical ECRH transmission system.** Yugo, J.J.; Shearer, J.W.; Ziolkowski, R.W. (Lawrence Livermore National Lab., CA (USA)). 7 Nov 1983. Contract W-7405-ENG-48. 6p. (CONF-831105—5). NTIS, PC A02/MF A01. Order Number DE84004792.

From Meeting of the Plasma Physics Division of the American Physical Society; Los Angeles, CA, USA (7 Nov 1983).

The microwave transmission system for ERCH on MFTF-B will utilize quasi-optical transmission techniques. The system consists of ten gyrotron oscillators: two gyrotrons at 28 GHz, two at 35 GHz, and six at 56 GHz. The 28 and 35 GHz gyrotrons both heat the electrons in the end plug (potential peak) while the 56 GHz sources heat the minimum-B anchor region (potential minimum). Microwaves are launched into a pair of cylindrical mirrors that form a pseudo-cavity which directs the microwaves through the plasma numerous times before they are lost out of the cavity. The cavity allows the microwave beam to reach the resonance zone over a wide range of plasma densities and temperatures. The fundamental electron cyclotron resonance moves to higher axial positions as a result of beta-depression of the magnetic field, doppler shifting of the resonance, and relativistic mass corrections for the electrons. With this system the microwave beam will reach the resonance surface at the correct angle of incidence for any density or temperature without active aiming of the antennas. The cavity also allows the beam to make multiple passes through the plasma to increase the heating efficiency at low temperatures and densities when the single pass absorption is low. In addition, neutral beams and diagnostics have an unobstructed view of the plasma.

11339 **(UCRL—90059) Radiation-induced electrical breakdown of helium in fusion reactor superconducting magnet systems.** Perkins, L.J. (Lawrence Livermore National Lab., CA (USA)). 2 Dec 1983. Contract W-7405-ENG-48. 7p. (CONF-831203—54). NTIS, PC A02/MF A01. Order Number DE84004359.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

A comprehensive theoretical study has been performed on the reduction of the electrical breakdown potential of liquid and gaseous helium under neutron and gamma radiation. Extension of the conventional Townsend breakdown theory indicates that radiation fields at the superconducting magnets of a typical fusion reactor are potentially capable of significantly reducing currently established (i.e., unirradiated) helium breakdown voltages. Emphasis is given to the implications of these results including future deployment choices of magnet cryogenic methods (e.g., pool-boiling versus forced-flow), the possible impact on magnet shielding requirements and the analogous situation for radiation-induced electrical breakdown in fusion RF transmission systems.

11340 **(UCRL—90092) Superconducting (radiation hardened) magnets for mirror fusion devices.** Henning, C.D.; Dalder, E.N.C.; Miller, J.R.; Perkins, J.R. (Lawrence Livermore National Lab., CA (USA)). 7 Dec 1983. Contract W-7405-ENG-48. 9p. (CONF-831203—53). NTIS, PC A02/MF A01. Order Number DE84004076.

From 10. symposium on fusion engineering; Philadelphia, PA, USA (5 Dec 1983).

Superconducting magnets for mirror fusion have evolved considerably since the Baseball II magnet in 1970. Recently, the Mirror Fusion Test Facility (MFTF-B) yin-yang has been tested to a full field of 7.7 T with radial dimensions representative of a full scale reactor. Now the emphasis has turned to the manufacture of very high field solenoids (choke coils) that are placed between the tandem mirror central cell and the yin-yang anchor-plug set. For MFTF-B the choke coil field reaches 12 T, while in future devices like the MFTF-Upgrade, Fusion Power Demonstration and Mirror Advanced Reactor Study (MARS) reactor the fields are doubled. Besides developing high fields, the magnets must be radiation hardened. Otherwise, thick neutron shields increase the magnet size to an unacceptable weight and cost. Neutron fluences in superconducting magnets must be increased by an order of magnitude or more. Insulators must withstand 10^{10} to 10^{11} rads, while magnet stability must be retained after the copper has been exposed to fluence above 10^{19} neutrons/cm^2.

11341 **(UCRL—90109) Reconnection in Spheromak formation and sustainment.** Hammer, J.H. (Lawrence Livermore National Lab., CA (USA)). 12 Dec 1983. Contract W-7405-ENG-48. 36p. (CONF-8310229—4). NTIS, PC A03/MF A01. Order Number DE84004157.

From Chapman conference on magnetic reconnection; Los Alamos, NM, USA (3 Oct 1983).

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The Spheromak is a magnetic confinement device that is being explored in both the US and Japanese fusion programs. It is a member of the Compact Torus family of magnetic structures characterized by a set of closed, nested toroidal flux surfaces but without any coils, transformer cores, etc. protruding through the hole in the torus. The Speromak is closely elated to the Reversed Field Pinch (RFP) in that most of the magnetic field is produced by plasma currents flowing along the magnetic field lines (a near force free field) rather than by external coils. The Spheromak has magnetic field components of comparable strength in both the toroidal (azimuthal) and poloidal (in the plane perpendicular to the azimuthal unit vector) directions. The large internal magnetic energy in the Spheromak makes it rich in magnetohydrodynamic phenomena and reconnection, in particular, plays an important role in the formation, resistive decay and instability processes.

11342 **Experimental investigation of muon-catalyzed d-t fusion.** Jones, S.E.; Anderson, A.N.; Caffrey, A.J.; Walter, J.B.; Watts, K.D.; Bradbury, J.N.; Gram, P.A.M.; Leon, M.; Maltrud, H.R.; Paciotti, M.A. (Idaho National Engineering Laboratory, Idaho Falls, Idaho 83415). *Physical Review Letters;* **51**: No. 19, 1757-1760(7 Nov 1983). Contract AC07-76ID01570;W-7405-ENG-36.

Measurements of the absolute neutron yield and the time dependence of the appearance of neutrons resulting from muon-catalyzed fusion have been carried out in high-density deuterium-tritium mixtures. The temperature dependence of the resonant dtμ-molecular formation process has been determined in the range 100 to 540 K. Mesomolecular formation is found to be resonant for DT as well as D_2 target molecules. The sticking probability and other fundamental parameters have been measured for the first time.

11343 **Scaling and electron penetration in slab plasmas.** Wienke, B.R. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **44**: 128-130(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11344 **Tritium diffusion in lithium oxide solid breeder materials.** Shearer, J.A.; Johnson, C.E.; Tam, S.W. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **44**: 139-140(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11345 **Blanket neutronics of a compact reversed-field pinch reactor.** Battat, M.E.; Krakowski, R.A.; LaBauve, R.J. (Los Alamos National Laboratory, P.O. Box 1663, Los Alamos, NM 87545). *Transactions of the American Nuclear Society;* **44**: 147-149(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11346 **Effect of polarized fusion on the neutronics of a mirror fusion reactor.** Takahashi, H.; Lazareth, O.W. (Brookhaven National Laboratory, Upton, NY 11973). *Transactions of the American Nuclear Society;* **44**: 149-151(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11347 **Nuclear data requirements for fusion reactors.** Abdou, M.A. (Argonne National Laboratory, 9700 S. Cass Avenue, Argonne, IL 60439). *Transactions of the American Nuclear Society;* **44**: 186-188(Jun 1983). (CONF-830609—).

From ANS annual meeting; Detroit, MI, USA (12 Jun 1983).

11348 **IPP: Jahresbericht 1982. (IPP: Annual report 1982).** Garching, Germany, F.R.; Max-Planck-Institut fuer Plasmaphysik (1982). 520-524p. (In German). Available from Max-Planck-Institut fuer Plasmaphysik, Garching (Germany, F.R.).

This report presents a detailed outline of the work accomplished within the framework of the Tokamak projects ASDEX and ASDEX Upgrade and the JET and NET projects, the stellarator projects VIII-A, VII-AS and VII-X, and of stellarator reactor system studies. The various scientific research departments, such as Experimental Plasma Physics 1, 2 and 3, Theoretical Plasma Physics 1 and 2, Plasma-Wall. Interactions, and Information Sciences give an account of the results of their research and development work. Further reports on the 1982 activities deal with a) the organisational structure of the IPP, b) administrative and business items, c) scientific publications and conference proceedings, and with d) IPP-supported projects at universities.

11349 **Studies of neutral beam power loss in stray magnetic fields.** Stewart, L.D. (Exxon Nuclear Co., Princeton Plasma Physics Lab.). *IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science;* **NS-28**: No. 2, 1323-1325(Apr 1981). (CONF-801111—).

From 6. conference on application of accelerators in research and industry; Denton, TX, USA (3 Nov 1980).

Reionization losses in neutral beams for magnetic confinement devices are significant and thus they are an important design consideration. This paper presents an overview of the analyses and data of the past ten years. Included is the traditional analysis, or Classical Effect, which considers the ion source and neutralizer as gas sources; the Culham Effect, which considers gas molecules knocked from walls as a significant additional gas source; and the PLT effect, which suggests wall outgassing is a significant additional gas source.

11350 **Tandem mirror reactor with an inherent thermal barrier.** Kammash, T.; Galbraith, D.L. (Michigan Univ., Ann Arbor (USA)). pp 1135-1140 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

The Basic Tandem Mirror Configuration is evaluated as a reactor allowing for unequal plug and central-cell electron temperatures as means of simulating the effect of a 'thermal barrier'. It is shown that the ratio of fusion power density to the power loss per unit volume in the plugs does increase when the temperatures are allowed to be unequal but simultaneously the central cell to plug volume ratio decreases sufficiently to result in a reduction in the Q-value of the system as compared to the case when the two temperatures are equal.

11351 **Steady-state tokamak reactor with non-divertor impurity control - STARFIRE.** Baker, C.C. (Argonne National Lab., IL (USA)). pp 1161-1167 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

STARFIRE is a conceptual design study of a commercial tokamak fusion electric power plant. Particular emphasis has been placed on simplifying the reactor concept by developing design concepts to produce a steady-state tokamak with non-divertor impurity control and helium ash removal. The concepts of plasma current drive using lower hybrid rf waves and a limiter/vacuum system for reactor applications are described.

11352 **Inertial confinement fusion reactor systems.** Frank, T.G.; Bohachevsky, I.O.; Pendergrass, J.H. (Los Alamos Scientific Lab., NM (USA)). pp 1179-1185 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

A variety of reactor cavity concepts, drivers, and energy conversion mechanisms are being considered to realize commercial applications of ICF. Presented in this paper are: (1) a review of reactor concepts with estimates of practically achievable pulse repetition rates, (2) a survey of drivers with estimates of the requirements on reactor conditions imposed by beam propagation characteristics, and (3) an assessment of compatible driver-reactor combinations.

11353 **HYFIRE: a Tokamak - high-temperature electrolysis system.** Fillo, J.A.; Powell, J.R.; Steinberg, M.; Benenati, R.; Horn, F.; Isaacs, H.; Lazareth, O.W.; Makowitz, H.; Usher, J. (Brookhaven National Lab., Upton, NY (USA)). pp 1215-1221 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

Brookhaven National Laboratory (BNL) is carrying out a comprehensive conceptual design study called HYFIRE of a commercial fusion Tokamak reactor, high-temperature electrolysis system. The study is placing particular emphasis on the adaptability of the STARFIRE power reactor to a synfuel application. The HYFIRE blanket must perform three functions: a) provide high-temperature (approx. 1400 deg C) process steam at moderate pressures (in the range of 10 to 30 atm) to the high-temperature electrolysis (HTE) units; b) provide high-temperature (approx. 700 deg to 800 deg C) heat to a thermal power cycle for generation of electricity to the HTE units; and c) breed enough tritium to sustain the D-T fuel cycle. In addition to thermal energy for the decomposition of steam into its constituents, H_2 and O_2, electrical input is required. Fourteen hundred degree steam coupled with 40% power cycle efficiency results in a process efficiency (conversion of fusion energy to hydrogen chemical energy) of 50%.

11354 **High flux energy and particle collection scheme for divertors.** Werley, K.A.; Gilligan, J.G.; Miley, G.H. (Illinois Univ., Urbana (USA). Fusion Studies Lab.). pp 1223-1228 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

A lithium rain approach is described for handling the large divertor ion and energy fluxes (10^{23} ions/m^{2}s and 10 MW/m^2) inherent to a power producing reactor. Previous concepts, which use a solid wall or gravity driven liquid metal flow, face serious feasibility questions dealing with thermo-mechanical wall material limitations or MHD retardation forces on a moving conducting fluid. The new scheme uses a rain of high speed (1 to 166 m/s) lithium droplets, formed by nozzles outside of the magnetic field, to collect diverted ions and their energy.

11355 **'compact' reversed-field pinch (CRFP) reactor design.** Miley, G.H.; Nebel, R.A. (Illinois Univ., Urbana (USA). Fusion Studies Lab.). pp 1229-1233 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

Many fusion reactor design studies have resulted in large and complex nuclear 'islands', making maintenance difficult, integration into smaller electrical networks impractical, and posing financial problems due to the large capital costs involved. Consequently, a new class of concepts, termed compact tori (CT), have evolved that could potentially lead to smaller, less complex systems. These concepts include Field Reversed Mirrors, Field Reversed Theta Pinches, and Spheromaks. They all share, to a varying extent, the common features of a closed toroidal configuration and a high-β field that is largely created by internal plasma currents. The Reversed Field Pinch (RFP) has a magnetic configuration that is similar in many respects to these CT. Consequently it too can be viewed as a candidate for a 'compact' system. While a relatively large major radius (and large aspect ratio) will be retained, the plasma chamber itself and the surrounding structure can enjoy a 'compactness' and still provide easy access.

11356 **Witamir-I, a tandem mirror reactor with non-zero nu.** Santarius, J.; Audenaerde, K. (Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering); Beyer, J. (Wisconsin Univ., Madison (USA). Dept. of Electrical and Computer Engineering) (and others). pp 1261-1265 of Fusion technology 1980. Vol. 2. Oxford, England; Pergamon Press (1981). (CONF-800950—Vols.1,2; EUR—7035).

From 11. symposium on fusion technology; Oxford, UK (15 Sep 1980).

In two volumes.

Witamir-I, a tandem mirror reactor, is a study by the University of Wisconsin fusion engineering design group. Various engineering aspects and physics considerations are presented. Witamir-I is a high Q device with particularly attractive maintenance features and blanket characteristics.

11357 **X-ray imaging of laser produced plasmas.** Duncan, C.I.R. Oxford, England; Oxford University (1981). 148p. Available from British Library, Boston Spa, Wetherby, West Yorks. No. D45026/83.

There is much current interest in laser driven compression as an approach to inertial confinement fusion. The success of this ap-

proach however, depends upon imploding hollow spherical shells to high densities in a stable and symmetrical manner. This thesis investigates the effects of large and small scale illumination non-uniformity on the symmetry of such implosions. Experiments were performed using infrared and green irradiation and radiographs were obtained using zone plate coded imaging and x-ray pinhole photography. The results show distortion of the imploding material due to large scale illumination asymmetry and rippling due to beam structure. Comparisons are made with theoretical predictions.

99 GENERAL AND MISCELLANEOUS

9901 Management

REFER ALSO TO CITATION(S) 11370, 11395

11358 **(ADSM—18-P46FD) Army Civilian Personnel System (ACPERS): functional description. Automated Data Systems Manual.** (Oak Ridge National Lab., TN (USA)). Dec 1983. Contract W-7405-ENG-26. 170p. NTIS, PC A08/MF A01. Order Number DE84004889.

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This Functional Description for the automated Army Civilian Personnel System (ACPERS) is written to provide: system requirements to be satisfied which will serve as a basis for mutual understanding between the user and the developer; information on performance requirements, preliminary design, and user impacts including fixed and continuing costs; and a basis for the development of the system tests.

11359 **(CONF-8310243—1) Typographical terminology.** Walker, T.R. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 4p. NTIS, PC A02/MF A01. Order Number DE84001981.

From IEEE Professional Communication Society conference; Atlanta, GA, USA (19 Oct 1983).

Portions are illegible in microfiche products.

Every craft develops its own language and printers are no exception. Technical writers and editors, in daily contact with printers and compositors, sometimes become confused by the language used. Today's compositors use high-speed, computerized phototypesetters instead of type cases and Linotype machines but many of the words they use were developed during the early days of printing when all type was set by hand from a typecase. Although the words, as used today, still have the same basic meaning, the editor or writer has no way of knowing the meaning unless they have a background in printing or typesetting. A listing of the most commonly used words and their origins and definitions will help clear some of the confusion. The inability to communicate with printers and typesetters frequently leads to misunderstandings and the production of work that does not meet the required standards.

11360 **(DOE/IG—0202) Government-owned property in the custody of contractors.** (Department of Energy, Washington, DC (USA). Office of Inspector General). 13 Jan 1984. 28p. TIC, PO Bx 62, Oak Ridge, TN 37831.

Report to the Secretary.

The management of government-owned property at 11 Department of Energy (DOE)-owned facilities was reviewed. The objectives of the review were to determine whether property was effectively acquired, used, and accounted for in the Department's financial records. The examination was made in accordance with generally accepted government auditing standards for economy and efficiency audits and included such tests of the procedures and accounting records as was considered necessary in the circumstances. The estimated value of government personal property in the hands of Departmental Contractors is more than $9 billion. This includes property owned or leased by either the government or contractors. During this review, the 11 contractors were visited and nearly 600 recently acquired capital items were examined. An attempt was made to learn if the property was properly acquired, adequately accounted for, properly utilized, and/or if not needed, whether appropriate disposal actions had been taken. The report cites deficiencies in the justification and documentation of purchase decisions, the accountability maintained over property on-hand, and in the identification and disposal of underutilized property.

11361 **(INIS-mf—8284) Publications of the University of Karlsruhe (T.H.) and the Nuclear Research Center Karlsruhe 1981.** (Karlsruhe Univ. (T.H.) (Germany, F.R.). Bibliothek; Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Literaturabteilung). 1982. 177p. (In German). NTIS (US Sales Only), PC A09/MF A01. Order Number DE83704763.

This is the 14th volume of the joint list of publications of the University of Karlsruhe (T.H.), the Nuclear Research Center Karlsruhe and some institutions which are closely linked to the University. It contains the publications of the year 1981 as well as some addenda from 1980. Included were books and journals, journal articles and contributions from compilations, research reports, dissertations and habilitation theses which were written or published by these institutions, their bodies and institutes as well as their teachers and scientific staff, and also patents. Not included were, as a rule, diploma theses, newspaper articles, reviews, internal reports and bulletins. The list of publications from University is mainly based on entries made by the institutes and chairs; its completeness can not be granted here.

11362 **(RISO-M—2377) Reports issued by the Risoe National Laboratory in the series: RISO-R reports and RISO-M reports.** (Risoe National Lab., Roskilde (Denmark)). Aug 1982. 91p. NTIS (US Sales Only), PC A05/MF A01; Also available from Risoe Library, Dk-4000 Roskilde, Denmark. Order Number DE83704603.

This list includes all scientific and technical reports issued from 1957 - May 1982 by Risoe National Laboratory, former Research Establishment Risoe. The list covers Riso-R and Risoe-M reports, and is arranged according to report numbers.

11363 **(RISO-M—2382) Annual report 1982 chemistry department.** Larsen, E.; Nielsen, O.J. (eds.). (Risoe National Lab., Roskilde (Denmark)). Apr 1983. 33p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704604.

The work going on in the Risoe National Laboratory, Chemistry Department is briefly surveyed by a presentation of all articles and reports published in 1982. The facilities and equipment are barely mentioned. The papers are divided into eight activities: 1. neutron activation analysis 2. analytical- and organic chemistry 3. environmental chemistry 4. polymer chemistry 5. geochemistry 6. radical chemistry 7. poitron annihilation 8. uranium process chemistry.

11364 **Summary and evaluation of the results of the symposium on the role of technology assessment in the decision-making process.** Paschen, H. Berlin, Germany; Unweltbundesamt (1983). vp. (CONF-8210185—Summ.).

From International symposium on the role of technology assessment in the decision-making process; Bonn, F.R. Germany (19 Oct 1982).

Individual papers were abstracted and indexed separately.

9902 Mathematics And Computers

REFER ALSO TO CITATION(S) 9492, 9760, 9829, 9934, 9974, 10506, 10608, 11358

11365 **(ANL—83-96) Approach to programming multiprocessing algorithms on the Denelcor HEP.** Lusk, E.L.; Overbeek, R.A. (Argonne National Lab., IL (USA)). Dec 1983. Contract W-31-109-ENG-38. 22p. NTIS, PC A02/MF A01. Order Number DE84005440.

In the process of learning how to write code for the Denelcor HEP, we have developed an approach that others may well find useful. We believe that the basic synchronization primitives of the HEP (i.e., asynchronous variables), along with the prototypical patterns for their use given in the HEP FORTRAN 77 User's Guide, form too low-level a conceptual basis for the formulation of multiprocessing algorithms. We advocate the use of monitors,

which can be easily implemented using the HEP primitives. Attempts to solve substantial problems without introducing higher-level constructs such as monitors can produce code that is unreliable, unintelligible, and restricted to the specific dialect of FORTRAN currently supported on the HEP. Our experience leads us to believe that solutions which are both clear and efficient can be formulated using monitors.

11366 **(ANL/MCS-TM—10) Minimax solution of a nonlinear system of mixed equalities and inequalities.** Garcia-Palomares, U.M. (Argonne National Lab., IL (USA)). Jul 1983. Contract W-31-109-ENG-38. 19p. NTIS, PC A02/MF A01. Order Number DE84003870.

A modification of a quadratic algorithm for solving a nonlinear system of mixed equalities and inequalities is proposed. Under suitable conditions, the modified algorithm always generates a local minimum of a function that represents the maximum violation of any equality of inequality of the system. A superlinear rate of convergence is achieved, when the maximum violation is null. Neither convexity nor constraint qualifications are required.

11367 **(ANSI/ANS—10.2-1982) American National Standard: recommended programming practices to facilitate the portability of scientific-computer programs.** (American Nuclear Society, La Grange Park, IL). Mar 1982. 11p. American Nuclear Society, 555 Kensington Ave., La Grange Park, IL 60525.

This standard recommends programming practices to facilitate the portability of computer programs prepared for scientific and engineering computations. These practices are intended to simplify implementation, conversion, and modification of computer programs.

11368 **(CONF-8310244—1) Algorithm to calculate proportional area transformation factors for digital geographic databases.** Edwards, R. (Oak Ridge National Lab., TN (USA)). 1983. Contract W-7405-ENG-26. 11p. NTIS, PC A02/MF A01. Order Number DE84004456.

From Spatially-Oriented Referencing Systems Association (SORSA) general meeting; College Park, MD, USA (10 Oct 1983).

A computer technique is described for determining proportionate-area factors used to transform thematic data between large geographic areal databases. The number of calculations in the algorithm increases linearly with the number of segments in the polygonal definitions of the databases, and increases with the square root of the total number of chains. Experience is presented in calculating transformation factors for two national databases, the USGS Water Cataloging Unit outlines and DOT county boundaries which consist of 2100 and 3100 polygons respectively. The technique facilitates using thematic data defined on various natural bases (watersheds, landcover units, etc.) in analyses involving economic and other administrative bases (states, counties, etc.), and vice versa.

11369 **(DOE/ER/10357—1) Implementation of MACLISP on a large address space computer. Final report.** Moses, J. (Massachusetts Inst. of Tech., Cambridge (USA)). 21 Dec 1983. Contract AC02-79ER10357. 4p. NTIS, PC A02/MF A01. Order Number DE84005042.

This is a belated final report on the implementation of NIL - the New Implementation of LISP. Work on this project began in 1978 and is still continuing. The original timetable for the project - two years - slipped badly. It took us over four years to get a working version ready for distribution. We have distributed at this point over 130 copies of the NIL System and many of the users find it superior to all available alternatives on the DEC VAX. In that sense the project has been quite successful.

11370 **(DOE/ER/12048—T1) Evaluation of the large scale computing needs of the energy research program and how to meet them. Final report.** Miller, B. (Hart (Fred C.) Associates, Inc., Washington, DC (USA)). [nd]. Contract AC01-82ER12048. 52p. NTIS, PC A04/MF A01. Order Number DE84005355.

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The Energy Research program may be on the verge of abdicating an important role it has traditionally played in the development and use of state-of-the-art computer systems. The lack of easy access to Class VI systems coupled to the easy availability of local, user-friendly systems is conspiring to drive many investigators away from forefront research in computational science and in the use of state-of-the-art computers for more discipline-oriented problem solving. The survey conducted under the auspices of this contract clearly demonstrates a significant suppressed demand for actual Class VI hours totaling the full capacity of one such system. The current usage is about a factor of 15 below this level. There is also a need for about 50% more capacity in the current mini/midi availability. Meeting the needs of the ER community for this level of computing power and capacity is most probably best achieved through the establishment of a central Class VI capability at some site linked through a nationwide network to the various ER laboratories and universities and interfaced with the local user-friendly systems at those remote sites.

11371 **(DOE/ET/29365—2) Numerical and theoretical investigations into a continuation approach to decentralized control.** Harris, T.L. (Purdue Univ., Lafayette, IN (USA)). May 1982. Contract AC01-79ET29365. 170p. NTIS, PC A08/MF A01. Order Number DE84005504.

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This thesis investigates theoretical and numerical aspects of a continuation approach to decentralized eigenvalue assignment for interconnected linear systems. In particular, a continuation method is developed to construct decentralized output feedback to assign a desired set of natural frequencies to a system. This method is a homotopy technique which imbeds the decentralized control problem into a parameterized family of decentralized control problems. The parameterization is based on the system interconnections and represents a measure of the coupling between subsystems. A differential equation is constructed based on this parameterization. The initial condition of this differential equation is the feedback required to assign eigenvalues to the decoupled system, and the endpoint of the equation's solution trajectory is the decentralized output feedback required for eigenvalue in the original problem.

11372 **(DOE/ET/53075—T1) NIL notes for release 0.259.** Burke, G.S.; Carrette, G.J.; Eliot, C.R. (Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Computer Science). Jun 1983. Contract AC02-78ET53075. 240p. NTIS, PC A11/MF A01. Order Number DE84005045.

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This document describes NIL, a New Implementation of Lisp. NIL is currently under development on the DEC VAX under the VAX/VMS operating system.

11373 **(DOE/ET/53075—T2) Introduction to NIL.** Burke, G. (Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Computer Science). Mar 1983. Contract AC02-78ET53075. 58p. NTIS, PC A04/MF A01. Order Number DE84005044.

This document is a primer for NIL, a New Implementation of Lisp. It is not a description or overview of the language, but rather documentation of some of the ordinary facilities available, so that those with some small LISP experience can use NIL in a basic way.

11374 **(EGG-IS—6478) Cyber Visual System (CVS) reference manual.** Snider, D.M.; Wagner, K.L. (EG and G Idaho, Inc., Idaho Falls (USA)). Dec 1983. Contract AC07-76ID01570. 97p. NTIS, PC A05/MF A01. Order Number DE84005191.

This is a reference manual for the Idaho National Engineering Laboratory (INEL) Cyber Visual System. The manual contains a summary of the operation of the CVS program and describes the hardware requirements. It explains the main features and operation of the program as well as how to communicate with the host computer. CVS is a high performance color graphics system. This system enables color pictures to be generated and edited on a color raster terminal and subsequently output as 35mm color transparencies and grey-scale or black and white hard copies. CVS provides processors for the construct word slides, tables, charts, and sketch-

es. Commands for the creation and editing of images are entered by picking items from menus displayed on the terminal screen. The CVS program executed on a Control Data Corporation (CDC) CYBER 176 computer in a NOS/BE environment. The user interacts with CVS through a color terminal. There is no requirement as to the brand of color terminal. However, only drivers for the AED line of terminals are currently available. As other terminals become available, new driver modules will be added.

11375 **(IC—81/235) Vector-valued measure and the necessary conditions for the optimal control problems of linear systems.** Xunjing, L. (International Centre for Theoretical Physics, Trieste (Italy)). Dec 1981. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704431.

The vector-valued measure defined by the well-posed linear boundary value problems is discussed. The maximum principle of the optimal control problem with non-convex constraint is proved by using the vector-valued measure. Especially, the necessary conditions of the optimal control of elliptic systems is derived without the convexity of the control domain and the cost function.

11376 **(IC—82/38) Optimal control of distributed parameter system with incomplete information about the initial condition.** Kotarski, W.; Kowalewski, A. (International Centre for Theoretical Physics, Trieste (Italy)). Mar 1982. 23p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704443.

In this paper we consider an optimal control problem for a system described by a linear partial differential equation of the parabolic type with Dirichlet's boundary condition. We impose some constraints on the control. The performance functional has the integral form. The control time T is fixed. The initial condition is not given by a known function but belongs to a certain set (incomplete information about the initial state). The problem formulated in this paper describes the process of optimal heating, of which we do not have exact information about the initial temperature on the heated object. We present an example in which the set of admissible controls and one of initial conditions are given by means of the norm constraints too. The application of the well-known projective gradient method in the Hilbert space allows us to obtain the numerical solution for our optimization problem.

11377 **(IC—82/51) Extension of Hsup(p) functions in polydiscs.** Chee, P.S. (International Centre for Theoretical Physics, Trieste (Italy)). May 1982. 10p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704445.

For N=2 or 3 it is shown that if E is the zero set of a holomorphic function in Usup(N) satisfying the separation condition of Alexander, viz., there exist r is an element of (0,1) and delta>0 such that 'α-β'>=delta whenever (z',α,z'') not= (z',β,z'') are both in (Qsup(k-1)xUxQsup(N-k)) intersection E, where Q=(lambda is an element of C:r<'lambda'<1), then (a) E is the zero set of some F is an element of Hsup(infinity)(Usup(N)) and (b) for 0<p<=infinity, every g is an element of H(E) so that 'g'sup(p) has a pluriharmonic majorant on E extends to a G is an element of Hsup(p)(Usup(N)). This generalizes earlier results of the author [Proc. Amer. Math. Soc., 60, 109-115 (1976)] and of Zarantonello [ibid., 78, 519-524 (1980)].

11378 **(IC—82/66) Analytical examination of distortions in power spectra due to sampling errors.** Njau, E.C. (International Centre for Theoretical Physics, Trieste (Italy)). Jun 1982. 21p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704598.

Distortions introduced into spectral energy densities of sinusoid signals as well as those of more complex signals through different forms of errors in signal sampling are developed and shown analytically. The approach we have adopted in doing this involves, firstly, developing for each type of signal and for the corresponding form of sampling errors an analytical expression that gives the faulty digitization process involved in terms of the features of the particular signal. Secondly, we take advantage of a method described elsewhere [IC/82/44] to relate, as much as possible, the true spectral energy density of the signal and the corresponding spectral energy density of the faulty digitization process. Thirdly, we then develop expressions which reveal the distortions that are formed in the directly computed spectral energy density of the digitized signal. It is evident from the formulations developed herein that the types of sampling errors taken into consideration may create false peaks and other distortions that are of non-negligible concern in computed power spectra.

11379 **(IC—82/67) Power estimation of sinusoids mounted upon dc background: Conditional problems.** Njau, E.C. (International Centre for Theoretical Physics, Trieste (Italy)). Jun 1982. 17p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704599.

We analyse theoretically the distortions involved in directly computed energy spectra of sinusoid signals which are intermingled with dc background. It is shown that under certain stated conditions, the effect of strong dc background is, among others, to grossly exaggerate the computed energy or power density corresponding to the frequency of the sinusoid signal involved, and to clip onto "energy density approx.= $1/\omega^2$" relationship at low frequencies that is hardly affected by the choice of the sinusoid period. In the presence of sizeable mismatch between the initial and final phases of the sinusoid signal involved, the relationship "energy density approx.= $1/\omega^2$" is still maintained at low frequencies even when only few wavelengths of the sinusoid are included in the data samples. However, when the above-mentioned mismatch is negligible and at the same time the sinusoid wavelengths included in the data samples are few, the relationship "energy density is approx. constant" prevails at low frequencies whether or not the dc background is weak. The formulation is finally extended onto sinusoid signals mounted upon slowly changing background.

11380 **(IC—82/217) Formula relating infinitesimal Backlund transformations to hierarchy generating operators.** Hou, B.Y.; Tu, G.Z. (International Centre for Theoretical Physics, Trieste (Italy)). Dec 1982. 13p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704438.

Let u'=Bsub(eta)u and l be, respectively, the elementary Backlund transformation and hierarchy generating operators for the AKNS equations. It is shown that (dB/d eta)(Bsub(eta))$^{-1}=\sigma_3/$(l-eta). A similar formula relating to the general NxN matrix spectral problem is also derived.

11381 **(IC—82/225) Necessary and sufficient conditions of the optimality for hyperbolic systems with non-differentiable performance functional.** Kowalewski, A. (International Centre for Theoretical Physics, Trieste (Italy)). Nov 1982. 15p. NTIS (US Sales Only), PC A02/MF A01. Order Number DE83704440.

In this paper an optimal control problem with non-differentiable cost function for distributed parameter system is solved. As an example an optimal control problem for system described by a linear partial differential of hyperbolic type with the Neuman's boundary condition is considered. By use of the Milutin-Dubovicki method, necessary and sufficient conditions of optimality with non-differentiable performance functional and constrained control are derived for Neuman's problem.

11382 **(LA-UR—83-3396) Interactive benchmark comparison between a VAX 11/780 and a VAX 11/782.** Lubeck, O.; Martinez, R. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 5p. (CONF-8310182—7). NTIS, PC A02/MF A01. Order Number DE84003828.

From US fall DECUS symposium; Las Vegas, NV, USA (24 Oct 1983).

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In this paper, we present the results of a benchmark comparison between a single processor VAX 11/780 and a dual processor VAX 11/782. Using the VMS Monitor utility and available accounting data, we first parameterized the workload on the VAX 11/782. We developed synthetic scripts that matched both the current workload parameters and also generated four forecasted workloads. Using a remote terminal emulator (RTE), we submitted interactive user commands from the scripts to the single and dual processor VAXs. Response times were then measured as a function of script category and VAX model.

11383 **(LA-UR—83-3397) Cray/VAX interactive graphics system.** Willerton, D.L. (Los Alamos National Lab., NM (USA)). 1983. Contract W-7405-ENG-36. 4p. (CONF-8310182—6). NTIS, PC A02/MF A01. Order Number DE84003826.

From US fall DECUS symposium; Las Vegas, NV, USA (24 Oct 1983).

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A new graphics system has been brought into production at Los Alamos National Laboratory that interfaces under codes running on the Cray-1 computers with an Evans and Sutherland Multi Picture System high-speed, high-resolution graphics workstation. The system is described from three points of view: hardware, software, and software functions. Special emphasis is placed on the use of detached processes, global sections, and event flag communication.

11384 **(LBL—16194) Multiplication of processing capacity with a parallel processor array.** Meng, J. (Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 8p. (CONF-8310194—3). NTIS, PC A02/MF A01. Order Number DE84004654.

From Asilomar conference on circuits, systems and computers; Pacific Grove, CA, USA (31 Oct 1983).

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A parallel connection of eight minicomputers is under test in an attempt to deal interactively with arrays of experimentally-generated kiloparameter data events. We have been able to achieve computer amplification factors linearly proportional to the number of executing processors. By replacing our minicomputers with single chip processor arrays, we expect to observe additional multiplication of data processing capacity.

11385 **(LBL—16805) Operation of a computer aided drafting system: improvements, results and hopes.** Millaud, J.; Goulding, F.; Salz, P.; Shimada, K. (Lawrence Berkeley Lab., CA (USA)). Oct 1983. Contract AC03-76SF00098. 12p. (CONF-8310160—1). NTIS, PC A02/MF A01. Order Number DE84005176.

From 3. DOE workshop on computer-aided engineering; Livermore, CA, USA (13 Oct 1983).

A two workstation Computer Aided Drafting system has been in operation since September 1982 at the Lawrence Berkeley Laboratory, Department of Instrument Science and Engineering. Improvements made to the original hardware and software configuration are described. Benefits from this installation are reported and future developments are outlined.

11386 **(PNL-SA—9932) Variable user interface construction techniques.** Thomas, J.J. (Pacific Northwest Lab., Richland, WA (USA)). Sep 1981. Contract AC06-76RL01830. 16p. (CONF-820318—4). NTIS, PC A02/MF A02. Order Number DE83002710.

From Conference on human factors in computer systems; Washington, DC, USA (15 Mar 1982).

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The ability to construct applications that have variable user interfaces is becoming a desired characteristic in many application areas. One such area is human factors research. Here the ability to provide multiple user interfaces to a single application, without application modification, allows testing of a variety of user interfaces with controlled experiments. By variable user interfaces, the authors mean a user interface which is a function of the available interaction hardware combined with the user environment and user familiarity with the system. Example user interfaces discussed in this paper include structured interaction sequences, i.e., menus, and unstructured interaction sequences offered by command systems. Both types of interfaces can be provided for a range of applications through a single application interface. The techniques discussed also address an approach toward providing a common interaction style across several application domains.

11387 **(PNL-SA—11765) Architecture for a user interface management system.** Thomas, J.J. (Pacific Northwest Lab., Richland, WA (USA)). Oct 1983. Contract AC06-76RL01830. 7p. (CONF-8311115—1). NTIS, PC A02/MF A01. Order Number DE84003982.

From Workshop on user interface management system; Frankfurt, F.R. Germany (1 Nov 1983).

The term User Interface Management System has been coined to represent a set of software tools for the construction and control of the interaction dialogue between the user and the computational resource. This set of software tools will have a significant impact on the structure of applications in the future. Its advantages include faster and more reliable application development, consistent user interfaces across application domains, and easily modifiable user interfaces. Also, the user interface management systems are an essential experimental tool for research in the human computer interface. This paper describes a brief history of UIMS and an architecture for a specific UIMS to provide an adaptable user interface.

11388 **(SAND—83-1376C) Altering the application of the traditional systems lifecycle.** Schofield, J.R. Jr. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 15p. (CONF-8310211—2). NTIS, PC A02/MF A01. Order Number DE84000052.

From USE conference; Orlando, FL, USA (4 Oct 1983).

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The following material examines many of the issues which face the systems analyst today. The paper is designed to build an argument for altering the system's development process. Maintenance is briefly mentioned to reveal the common attributes between some maintenance tasks and development work. Although economic benefits justify altering the development approach, intangible benefits are realized as well.

11389 **(SAND—83-1874C) One solution to STAR-1100 in a dual machine environment.** (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 9p. (CONF-8310211—3). NTIS, PC A02/MF A01. Order Number DE83017160.

From USE conference; Orlando, FL, USA (4 Oct 1983).

Very few initial problems were encountered in moving to the split STAR. Modifications to STAR to allow a split machine environment as described here included modification of the scratch and clean run to include two machines and a change to the EXEC portion of STAR to turn off some file name checking. The change was almost transparent to the user community with two one-page bulletins providing sufficient information and no runstream changes required. After initial training, the tape library is functioning smoothly. In spite of the physical proximity of our two machines, very little operator confusion has resulted. This solution to the dual machine problem appears quite satisfactory providing there is no overriding need to be able to write individual tapes on both machines at will. There does not seem to be any reason why this solution could not be expanded to an environment with more than two machines.

11390 **(SAND—83-2072C) Bootstrapping RSX-11S from ROM memories.** Chipman, A. (Sandia National Labs., Albuquerque, NM (USA)). 1983. Contract AC04-76DP00789. 7p. (CONF-8309197—1). NTIS, PC A02/MF A01. Order Number DE83018234.

From DECUS symposium; Las Vegas, NV, USA (29 Sep 1983).

A technique has been devised for bootstrapping RSX-11S from read-only memories. This papers describes a method for storing an RSX-11S system into PROM, and then loading it into RAM for execution. A full 124 kW system was saved into 64 4Kb PROM. The bootstrap program necessary to load and execute the system is also described.

11391 **(UCRL—15570) DIGLIB for HP-1000 computers.** Treadway, T.R. (General Electric Co., Sunnyvale, CA (USA)). Nov 1983. Contract W-7405-ENG-48. 151p. NTIS, PC A08/MF A01. Order Number DE84004741.

DIGLIB (Device Independent Graphic LIBrary), originally developed by Hal R. Brand for DEC computers, has been modified for use by HP 1000 computers running under RTE. DIGLIB consists of a small but functionally complete set of FORTRAN-callable library subroutines for creating arbitrary views of two-dimensional objects and for supporting interaction between the graphic applica-

tion program and its user. Graphic presentation is oriented towards interactive graphic display devices (such as the HP 2648A or Tektronix 4025) and line-drawing plotters (like the CalComp pen plotters). In addition, a high density Versatec V-80 or 1200 electrostatic printer/plotter interface is available. DIGLIB makes the application program independent of the specific graphic hardware devices, thereby presenting a uniform programmer interface to the graphics library, requiring few modifications (typically one) to the application program in order to accommodate a different graphics configuration. A device-independent subroutine library provides a high level of program portability, allowing support of a variety of different display controllers and operating environments.

11392 **(UCRL—90030) Generalization of the numerical Schwarz algorithm.** Rodrigue, G.; Simon, J. (Lawrence Livermore National Lab., CA (USA)). 1983. Contract W-7405-ENG-48. 13p. (CONF-831256—1). NTIS, PC A02/MF A01. Order Number DE84003735.

From 6. international conference on computing methods in applied sciences and engineering; Paris, France (12 Dec 1983).

The Schwarz alternating method of decomposing the domain has lately been found to be an effective means for solving elliptic partial differential equations on a multiprocessing computing system. In this paper, the method is recast into numerical linear algebra so that classical techniques of acceleration can be applied. Computional results using an incomplete-factorization as a pre-conditioner are given. A study of the effects of convergence by varying the subdomains is made.

11393 **Efficient algorithm for bifurcation problems of variational inequalities.** Mittelmann, H.D. *Mathematics of Computation;* **41**: No. 164, 473-589(Oct 1983). Contract AM03-76SF00326.

For a class of variational inequalities on a Hilbert space H bifurcating solutions exist and may be characterized as critical points of a functional with respect to the intersection of the level surfaces of another functional and a closed convex subset K of H. In a recent paper [13] we have used a gradient-projection type algorithm to obtain the solutions for discretizations of the variational inequalities. A related but Newton-based method is given here. Global and asymptotically quadratic convergence is proved. Numerical results show that it may be used very efficiently in following the bifurcating branches and that is compares favorably with several other algorithms. The method is also attractive for a class of nonlinear eigenvalue problems (K = H) for which it reduces to a generalized Rayleigh-quotient interaction. So some results are included for the path following in turning-point problems.

11394 **Anderson-Bjoerck for linear sequences.** King, R.F. *Mathematics of Computation;* **41**: No. 164, 591-783(Oct 1983).

The proposed one-point method for finding the limit of a slowly converging linear sequence features an Anderson-Bjoerck extrapolation step that had previously been applied to the Regula Falsi problem. Converegence is of order 1.839 as compared to $\sqrt{2}$ for the well-known Aitken-Steffensen δ^2-process, and to 1.618 for another one-point extrapolation procedure of King. There are examples for computing for computing a polynomial's multiple root with Newton's method and for finding a fixed point of a nonlinear function.

9903 Information Handling

REFER ALSO TO CITATION(S) 9226, 9824, 9888, 10475, 11115

11395 **(DOE/EV/10341—T1) Assessment of the DOE Office of Environment Planning and Budgeting Information System. Final report.** Gerson, J.I.; Hinckley, A.D.; McNeal, J.P. (General Research Corp., McLean, VA (USA)). Jul 1981. Contract AC01-80EV10341. 69p. (IRT—23400/1). NTIS, PC A04/MF A01. Order Number DE84004748.

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This report defines and assesses the Department's Planning, Programming, and Budgeting System (PPBS) as one critical component of the environmental information system. Preliminary research undertaken for this contract indicated that a major gap existed between DOE operating systems and the Agency-wide PPBS. Therefore, it was deemed appropriate to document the more encompassing PPBS as an initial contract effort. The other pertinent components of the environmental information system could be appraised in the context of PPBS requirements.

11396 **(LA-UR—83-3395) Experiment in benchmarking database systems.** Martinez, R.; Wiley, R.; Bitton, D.; Turbyfill, C. (Los Alamos National Lab., NM (USA); Cornell Univ., Ithaca, NY (USA)). 1983. Contract W-7405-ENG-36. 7p. (CONF-8310182—8). NTIS, PC A02/MF A01. Order Number DE84003840.

From US fall DECUS symposium; Las Vegas, NV, USA (24 Oct 1983).

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This paper describes and analyzes an interactive benchmark of the INGRES database system, which we have recently performed at the Los Alamos National Laboratory. The benchmark includes single-user runs and an extensive set of multi-user runs composed by synthesizing workloads of increasing complexity. Basic estimates were obtained for the response type of a range of interactive queries and for several other measures of the database management system performance.

11397 **(LITH-MAT-R—83-02) Formal specification and implementation of operations in information management systems.** Sandewall, E. (Linkoeping Univ. (Sweden). Matematiska Institutionen). Feb 1983. 30p. NTIS (US Sales Only), PC A03/MF A01. Order Number DE83704595.

Among information management systems we include general purpose systems, such as text editors and data editors (forms management systems), as well as special purpose systems such as mail systems and computer based calendars. Based on a method for formal specification of some aspects of IMS, namely the structure of the data base, the update operations, and the user dialogue, the paper shows how reasonable procedures for executing IMS operations can be written in the notation of a first-order theory, in such a way that the procedure is a logical consequence of the specification.

9905 Civilian Defense

11398 **(IFE/KR/E—82/001V) Shielding factors for typical houses in the Nordic countries.** Tveten, U. (Institute for Energy Technology, Kjeller (Norway)). Sep 1982. 47p. NTIS (US Sales Only), PC A04/MF A01. Order Number DE83704551.

The report presents the result of calculations of shielding factors that have been performed for typical houses (appartment buildings and one family houses) in Denmark, Finland, Norway and Sweden. A computer model developed at Risoe National Laboratory, Denmark has been used. The situation when radioactive materials are deposited on the walls and roof of the house as well as on the ground surrounding the house, has been considered. It appears from the report that the shielding factors can vary considerably with house type. In many cases the variation in total individual and collective radiation doses will be proportional to the shielding factor.

11399 **(UCID—19933) Heat conduction analog model of urban fire spread.** Reitter, T.A. (Lawrence Livermore National Lab., CA (USA)). Nov 1983. Contract W-7405-ENG-48. 41p. NTIS, PC A03/MF A01. Order Number DE84005075.

This report describes a model of urban fire spread. The model attempts to simulate the gross features of urban fire spread by adjusting parameters in a 2-D transient heat conduction code. The requirements imposed on the model are that the spread probabilities agree with those taken from empirical data or more sophisticated modesl, and that the results for the simple test problems be physically plausible. The effects of a constant wind velocity have also been simulated, but the results suffer from the lack of data for adjustment of parameters. The results of this preliminary investigation are encouraging. However, justification for further develop-

ment requires a direct comparison of costs and results using a more sophisticated model.

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Atomic Energy of Canada Ltd., Pinawa, Manitoba. Whiteshell Nuclear Research Establishment
Evaluation of phyllosilicates as a buffer component in the disposal of nuclear fuel waste, 9:9456 (R;CA)
Fourth annual report of the Canadian Nuclear Fuel Waste Management Program, 9:9455 (R;CA)
Australian Atomic Energy Commission Research Establishment, Lucas Heights
Environmental survey at the Lucas Heights Research Laboratories, 1981, 9:10678 (R;AU)
Automotive Testing Labs., Inc., Aurora, CO (USA)
Study of emissions from light-duty vehicles in Denver. Final report, 9:10195 (R;US)

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Bangert (Thomas), Eureka Springs, AR (USA)
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Workshop on solid state switches for pulsed power, held January 12-14, 1983 at Tamarron, Colorado. Final report, 9:10447 (R;US)
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Heavy recycle solvent studies in two-stage coal liquefaction. Fifth technical progress report, June 11-September 10, 1983, 9:9232 (R;US)
Long-term performance of materials used for high-level waste packaging. Second quarterly report, year two, July 1983-September 1983. Volume 2, 9:9484 (R;US)
Battelle-Institut e.V., Frankfurt am Main (Germany, F.R.)
Increased probability of failure detection by improving the signal-noise ratio during ultrasonic testing. Pt. 2. Austenitic welded joint and austenitic cast iron, 9:10439 (R;DE;In German)
Technological risks and social conflicts. Political risk strategies in the debate of nuclear energy. Text volume, 9:10006 (R;DE;In German)
Battelle Memorial Inst., Columbus, OH (USA). Office of Nuclear Waste Isolation
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Bernhard Engineering, St. Louis, MO (USA)
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Bituminous Coal Research, Inc., Monroeville, PA (USA). National Lab.
Evaluation of the effect of coal cleaning on fugitive elements. Phase IV. Identification of mineral forms in coal. Quarterly progress report No. 2, September 1-November 30, 1983, 9:9297 (R;US)
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BEPS equivalency study. Final report, 9:10018 (R;US)
Bradford Univ. (UK). Postgraduate School of Electrical and Electronic Engineering
Estimation of totals of global solar radiation on a horizontal surface from UK average meteorological data. Research report, 9:9584 (R;US)
Brandeis Univ., Waltham, MA (USA). Dept. of Chemistry
Photochemical reactions of complex molecules in condensed phase. Progress report, March 1, 1983-February 28, 1984, 9:10377 (R;US)
Photochemistry of 9,10-anthraquinone-2-sulfonate in solution. Part II. Effects of inorganic anions; quenching vs. radical formation at moderate and high anion concentrations, 9:10378 (R;US)
Brandeis Univ., Waltham, MA (USA). Dept. of Physics
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Metal boride catalysts for indirect liquefaction. Quarterly technical progress report, September 1-November 30, 1983, 9:9536 (R;US)
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Brown Univ., Providence, RI (USA). Dept. of Engineering
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Bundesministerium fuer Gesundheit und Umweltschutz, Vienna (Austria)
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Bundesstelle fuer Aussenhandelsinformation, Koeln (Germany, F.R.)
Zimbabwe - energy situation 1981/82, 9:10029 (R;DE;In German)

Bureau of Mines, Washington, DC (USA)
Costs and effects of environmental protection controls regulating US phosphate rock mining. Information circular, 9:9991 (R;US)

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Caen Univ., 14 (France). Lab. de Physique Corpusculaire
Study of gamma-emitting radionuclides present in the sediments and algae of the "Baie de l'Orne" (Central Normandy Coast) collecting during the years 1980 - 1982, 9:10752 (R;FR;In French)

California Energy Resources Conservation and Development Commission, Sacramento (USA)
Report to the Legislature on the California Energy Commission's Geothermal Development Grant Program for Local Governments, 9:9733 (R;US)

California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering
Diffusion of gases in porous solids: simulations and measurements. Fifth quarterly technical proogress report, July 16, 1983-October 15, 1983, 9:10427 (R;US)

California Univ., Los Angeles (USA)
Influence of late radiation effects on the immunological parameters of aging. Final technical report, September 1977-August 1983, 9:10846 (R;US)

California Univ., Los Angeles (USA). Dept. of Chemistry
Resonance Raman spectra of photochemical picosecond transients: method and application to study bacteriorhodopsin primary processes, 9:10765 (R;US)

Canadian Commercial Corp., Ottawa, Ontario
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Carnegie-Mellon Univ., Pittsburgh, PA (USA)
Program of research on microfabrication techniques for vlsi magnetic devices. Interim progress report 30 Sep 1981-29 Sep 1982, 9:10446 (R;US)

Carnegie-Mellon Univ., Pittsburgh, PA (USA). Dept. of Mechanical Engineering
Vaporization and devolatilization of coal water sprays. Fifth quarterly report for the period ending November 11, 1983, 9:9303 (R;US)

Carolina Power and Light Co., Raleigh, NC (USA)
North Carolina Rate Demonstration Project. Project Library. Part 1, 9:10065 (R;US)

Carrier Corp., Syracuse, NY (USA). Energy Systems Div.
Development of a high temperature solar powered water chiller. Phase III. Technical progress report, October 1, 1979-July 31, 1981, 9:9700 (R;US)

Case Western Reserve Univ., Cleveland, OH (USA). Dept. of Macromolecular Science
Spectroscopic characterization of the cured state of acetylene-terminated resin. Final report 1 Apr 1982-31 Mar 1983, 9:10285 (R;US)

Catalytic, Inc., Wilsonville, AL (USA)
Wilsonville advanced coal liquefaction research and development facility, Wilsonville, Alabama. Topical report No. 7. Operation and maintenance, 1982, 9:9231 (R;US)

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CEA Centre d'Etudes Nucleaires de Saclay, 91 - Gif-sur-Yvette (France). Service de Physique Theorique
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Central Electricity Generating Board, Berkeley (UK). Berkeley Nuclear Labs.
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Central Electricity Generating Board, London (UK)
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C-E Power Systems, Windsor, CT (USA)
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City Coll., New York (USA). Dept. of Chemical Engineering
Evaluation of the slurry methanol reactor, 9:9546 (R;US)
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Clarkson Coll. of Tech., Potsdam, NY (USA). Dept. of Chemical Engineering
Numerical study of heat transfer in turbulent shear flow, 9:10426 (R;US)

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Colorado School of Mines, Golden (USA)
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Colorado School of Mines, Golden (USA). Dept. of Chemical and Petroleum Refining Engineering
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Colorado School of Mines, Golden (USA). Dept. of Geological Engineering
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Colorado Univ., Boulder (USA)
Degradation of evaporated aluminum films for solar reflectors. Final report, July 1, 1980-May 14, 1983, 9:9720 (R;US)
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Transport and transfer rates in the waters of the Continental Shelf. Annual report, June 1, 1981-April 30, 1984, 9:10738 (R;US)
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Commission of the European Communities, Brussels (Belgium). Directorate General for Science, Research and Development
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Superconductivity in filamentary eutectic composites. Final technical report, June 1, 1978-May 30, 1983, 9:10400 (R;US)
Department of Energy, Bartlesville, OK (USA). Bartlesville Energy Technology Center
Western Gas Sands Subprogram. Status report, October-November-December 1982, 9:9374 (R;US)
Department of Energy, Washington, DC (USA). Assistant Secretary for Nuclear Energy
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Department of Energy, Washington, DC (USA). Office of Inspector General
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Physical model of a fractured reservoir, 9:9734 (R;US)
Response of east Mesa and Raft River reservoirs to injection-backflow testing, 9:9735 (R;US)
Risk assessment of computer-controlled safety systems for fusion reactors, 9:11288 (R;US)
Technical Assistance and Advisory Group, report number 5. Volume 5, 9:9887 (R;US)
Vaporized wall material/plasma interaction during plasma disruption, 9:11188 (R;US)

EG and G, Inc., Goleta, CA (USA). Energy Measurements Group
1984 State of the art of the technology of mercuric iodide x-ray and gamma radiation detectors, 9:10580 (R;US)

EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group
Aerial radiological survey of the Three Mile Island Nuclear Station and surrounding area, Middletown, Pennsylvania, 9:10684 (R;US)

EG and G, Inc., Las Vegas, NV (USA). Remote Sensing Lab.
Aerial radiological survey of the Brunswick Steam Electric Plant and surrounding area, Southport, North Carolina. Date of survey: March 1980, 9:10685 (R;US)

Eidgenoessische Technische Hochschule, Zurich (Switzerland)
Method of effectiveness evaluation of system control in electric power systems, 9:10041 (R;CH;In German)

Electricite de France, 75 - Paris
Seismic model of the nuclear boiler SPX2, 9:9884 (R;FR;In French)

Electric Power Research Inst., Palo Alto, CA (USA)
Laboratory and field acceptance performance of CONAC, 9:9264 (R;US)

Energieforum Schweiz, Bern (Switzerland)
Energy policy in business, 9:9975 (R;CH;In German and French)

Energy and Environmental Analysis, Inc., Arlington, VA (USA)
Impact of GRI's (Gas Research Institute) industrial energy efficient programs. Final report Mar 1982-Feb 1983, 9:10148 (R;US)

Energyworks, Inc., West Newton, MA (USA)
Residential Conservation Service installer's guide, 9:10082 (R;US)

Environmental Protection Agency, Denver, CO (USA)
Device for underwater cryogenic cutting, 9:10414 (P;US)

Environmental Protection Agency, Washington, DC (USA). Office of Toxic Substances
Toxic substances control act (TSCA) report to congress for fiscal year 1982. Annual report, 9:9993 (R;US)

Erevanskij Fizicheskij Inst. (USSR)
Diagram summation method by means of legendre transformation by a scalar parameter and its application to an anharmonic oscillator, 9:11164 (R;SU)
Geometric reconstruction of events in the experiment on the investigation of the recoil proton polarization in the $\pi 0$-meson photoproduction, 9:11054 (R;SU;In Russian)
Magnetic spectrometer of the "Deuteron" device based on multiwire proportional chambers, 9:10577 (R;SU;In Russian)
Possibility of improving the multilayered detector energy resolution, 9:10579 (R;SU)
Stochastic processes and the dynamics of massive black holes, 9:10976 (R;SU)
X-ray transition radiation detection using the thin converters, 9:10578 (R;SU;In Russian)

ESG, Inc., Atlanta, GA (USA)
Midwest Appropriate Technology Small Grants Program project summaries, 9:9977 (R;US)
Midwest Appropriate Technology Small Grants Program: management analysis, 9:9999 (R;US)
Passive solar commercial buildings project. Project status report, November 1-December 31, 1983, 9:9698 (R;US)

E-Systems, Inc., Dallas, TX (USA)
Crosbyton Solar Power Project, Phase I. Volume I. Main text, 9:9684 (R;US)
Crosbyton Solar Power Project, Phase I. Volume II. Appendices A-H, 9:9685 (R;US)
Crosbyton Solar Power Project, Phase I. Volume III. Appendices I-M, 9:9686 (R;US)
Crosbyton Solar Power Project, Phase I. Volume IV. Main text, 9:9687 (R;US)
Crosbyton Solar Power Project, Phase I. Volume V. Appendices A-L, 9:9688 (R;US)

Exxon Research and Engineering Co., Florham Park, NJ (USA)
EDS coal liquefaction process development. Phase V. ECLP industrial hygiene program - II, 9:9221 (R;US)
Long term optimum performance/corrosion tests of combustion modifications for utility boilers. Host site: Columbus and Southern Ohio Electric Company, Conesville No. 5. Final report Jan 1979-Nov 1981, 9:10465 (R;US)

F

Faucett (Jack) Associates, Inc., Chevy Chase, MD (USA)
Assessment of institutional barriers to the use of natural gas in automotive vehicle fleets, 9:10130 (R;US)

Fermi National Accelerator Lab., Batavia, IL (USA)
Accelerating heavy ions in Fermilab, 9:10509 (R;US)
Combined function magnet profile design, 9:10492 (R;US)
Fermilab 1982. Annual report of the Fermi National Accelerator Laboratory, 9:10507 (R;US)
Heat conduction thru supports between 300°K and 4°K, 9:10404 (R;US)
Helium leak detector improved sensitivity speed choke, 9:10444 (R;US)
Report of ad hoc committee on future computing needs for Fermilab, 9:10506 (R;US)
Squid based beam current meter, 9:10508 (R;US)

FilmTec, Minneapolis, MN (USA)
Temperature-resistant elements for reverse osmosis treatment of hot process waste. Final report, 9:10140 (R;US)

Florida Univ., Gainesville (USA)
Retention of polyacrylamide by berea sandstone, baker dolomite, and sodium kaolinite during polymer flooding. Paper SPE 8981, 9:9323 (R;US)

Foersvarets Forskningsanstalt, Umea (Sweden)
Oral intake of radionuclides in the population. A review of biological factors of relevance for assessment of absorbed dose at long term waste storage, 9:10847 (R;SE)

Foster-Miller, Inc., Waltham, MA (USA)
Assessment of gas-fired commercial refrigeration. Final report Mar-Aug 1982, 9:10079 (R;US)

Foster Wheeler Energy Corp., Houston, TX (USA)
Crosbyton Solar Power Project, Phase I. Volume IV. Main text, 9:9687 (R;US)
Crosbyton Solar Power Project, Phase I. Volume V. Appendices A-L, 9:9688 (R;US)

G

GARD, Inc., Niles, IL (USA)
Evaluation of acoustic emission weld monitoring for coal gasification vessels. Final report, September 1979-March 1982, 9:9222 (R;US)

GA Technologies, Inc., San Diego, CA (USA)
Cavity launchers for ICRF, 9:11292 (R;US)
Impact of TRU waste storage on a stand-alone MRS facility, 9:9477 (R;US)
Neutron streaming through diagnostic penetrations in a fusion reactor shield, 9:11291 (R;US)

Gebhard (Thomas G.), Austin, TX (USA)
Brief reconnaissance studies for the addition of hydropower in Puerto Rico. Report No. 2, 9:9573 (R;US)
Brief reconnaissance study for the addition of hydropower for Banner Elk Dam, Banner Elk, North Carolina, 9:9562 (R;US)
Brief reconnaissance study for the addition of hydropower for Cecil Murray Dam, Ennice, North Carolina, 9:9563 (R;US)
Brief reconnaissance study for the addition of hydropower for Tampa Dam, Tampa, Florida, 9:9565 (R;US)

Brief reconnaissance study for the addition of hydropower for Gunpowder Dam No. 1, Granite Falls, North Carolina, 9:9564 (R;US)
Brief reconnaissance study for the addition of hydropower for Randolph Mills No. 1 Dam, Franklinville, North Carolina, 9:9568 (R;US)
Brief reconnaissance study for the addition of hydropower for Randolph Mills No. 2 Dam, Franklinville, North Carolina, 9:9569 (R;US)
Brief reconnaissance study for the addition of hydropower for Fairfield Lake Dam, Sapphire, North Carolina, 9:9570 (R;US)
Brief reconnaissance study for the addition of hydropower for Western Carolina University Dam, Cullowhee, North Carolina, 9:9571 (R;US)
Brief reconnaissance study for the addition of hydropower for Ward Dam, Sugar Grove, North Carolina, 9:9572 (R;US)
Brief reconnaissance study for the addition of hydropower for Henry River Dam, Morganton, North Carolina, 9:9574 (R;US)
Brief reconnaissance study for the addition of hydropower for Tate Dam, Boone, North Carolina, 9:9575 (R;US)
Brief reconnaissance study for the addition of hydropower for Moss Bluff Lock and Spillway, Moss Bluff, Florida, 9:9576 (R;US)
Brief reconnaissance study for the addition of hydropower for Downings Mill Dam, Choccolocco, Alabama, 9:9577 (R;US)
Brief reconnaissance study for the addition of hydropower for Autauga Creek Dam, Prattville, Alabama, 9:9578 (R;US)
Brief reconnaissance study for the addition of hydropower for Percy Quin Dam, McComb, Mississippi, 9:9579 (R;US)
Brief reconnaissance study for the addition of hydropower for Geiger Lake Dam, Hattiesburg, Mississippi, 9:9567 (R;US)
Brief reconnaissance study for the addition of hydropower for Lake Manatee Dam, Bradenton, Florida, 9:9566 (R;US)

General Atomic Co., San Diego, CA (USA)
Comparison of cask and dry well storage concepts for a stand-alone monitored retrievable storage/interim storage system, 9:9476 (R;US)

General Dynamics Corp., Groton, CT (USA). Electric Boat Div.
Characterization of fiber composite flywheels by ultrasonic imaging techniques, 9:9945 (R;US)

General Electric Co., Philadelphia, PA (USA). Space Systems Div.
Characterization of fiber composite flywheels by ultrasonic imaging techniques, 9:9945 (R;US)
Composite ring-disk flywheel design, fabrication, and testing, 9:9946 (R;US)

General Electric Co., Pittsfield, MA (USA). Power Transformer Dept.
Evaluation of advanced technologies for power transformers. Final report, Part 2, 9:10449 (R;US)

General Electric Co., San Jose, CA (USA). Nuclear Engineering Div.
BWR fuel bundle extended burnup program. Technical progress report, January 1982-December 1982, 9:9773 (R;US)
Flow-induced vibration for light water reactors. Program final report, 9:9836 (R;US)

General Electric Co., Schenectady, NY (USA). Advanced Energy Programs Dept.
Long term materials test program. Quarterly report, October-December 1982, 9:10461 (R;US)

General Electric Co., Schenectady, NY (USA). Electrical Systems and Technology Lab.
Evaluation of advanced technologies for power transformers. Final report, Part 2, 9:10449 (R;US)

General Electric Co., Sunnyvale, CA (USA)
DIGLIB for HP-1000 computers, 9:11391 (R;US)

General Research Corp., McLean, VA (USA)
Assessment of the DOE Office of Environment Planning and Budgeting Information System. Final report, 9:11395 (R;US)

Geological Survey, Champaign, IL (USA)
Hydrologic effects of storing liquified sewage sludge on strip-mined land, Fulton County, Illinois, 9:10744 (R;US)

Geological Survey, Reston, VA (USA)
Genesis of uranium- and gold-bearing Precambrian quartz-pebble conglomerates, 9:9421 (R;US)

Geomet Technologies, Inc., Gaithersburg, MD (USA)
Guidelines for monitoring indoor air quality. Research report, 9:10670 (R;US)

Gesamtverband des Deutschen Steinkohlenbergbaus, Essen (Germany, F.R.)
Acid rain and damage in forestry, 9:10928 (R;DE;In German)

GKSS-Forschungszentrum Geesthacht G.m.b.H., Geesthacht-Tesperhude (Germany, F.R.)
Fast neutron imaging by cellulose nitrate foils, 9:10794 (R;DE)
Fast neutron radiography in biology and medicine, 9:10795 (R;DE)
Radiation-induced changes of the ductility of amorphous $Fe_{40}Ni_{40}B_{20}$, 9:10226 (R;DE)

Glasgow Univ. (UK). Dept. of Anatomy
Ultrastructural effects of radiation on cells and tissues: concluding remarks, 9:10840 (R;US)

Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Atomnoj Ehnergii
Effect of a field structure on the particle behaviour in magnetic traps. Orthogonality condition, 9:11295 (R;SU;In Russian)
Low-temperature calorimeter for measuring heat capacity in magnetic fields up to 20 T, 9:10293 (R;SU;In Russian)

Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Moscow. Inst. Teoreticheskoj i Ehksperimental'noj Fiziki
Calibration of the IHEP neutrino detector spark calorimeter in the electron beam at the energy of 1-8 GeV, 9:10583 (R;SU;In Russian)
Four of time-to-digital converters with a broad dynamic range, 9:10452 (R;SU;In Russian)
Investigating parameters of the "Elena-F" and "Electron" detectors for space research using the separated beam no. 530 of the ITEF accelerator, 9:10585 (R;SU;In Russian)
Method of application of spark chambers with magnetostriction data output in arbitrary magnetic fields, 9:10584 (R;SU;In Russian)

Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Obninsk. Fiziko-Ehnergeticheskij Inst.
Stability of boron carbide crystal structure under irradition using fast reactor spectrum, 9:10270 (R;SU;In Russian)
Stability of irradiated boron carbide under isothermal annealing conditions, 9:10269 (R;SU;In Russian)

Gosudarstvennyj Komitet po Ispol'zovaniyu Atomnoj Ehnergii SSSR, Serpukhov. Inst. Fiziki Vysokikh Ehnergij
Methods of materials mechanical tests in nuclear BR-10 reactor. 4. Devices with torgue load transmission, 9:9865 (R;SU;In Russian)

Greater Washington Board of Trade, DC (USA)
Model industry initiated energy conservation program. Final report, 9:10174 (R;US)

Grenoble-1 Univ., 74 - Annecy (France). Lab. de Physique des Particules
Large drift tube arrays with external delay line readout, 9:10607 (R;FR)

Grenoble-1 Univ., 38 (France). Inst. des Sciences Nucleaires
Bifurcations and chaos of classical trajectories in a deformed nuclear potential, 9:11142 (R;FR)
Multidetector system for the search and investigation of high spin, high energy isomers produced in heavy ion induced nuclear reactions, 9:10582 (R;FR)

Grumman Aerospace Corp., Bethpage, NY (USA)
Design of the coolant system for the Large Coil Test Facility pulse coils, 9:11274 (R;US)

H

Handelskammer Hamburg (Germany, F.R.). Abt. Industrieller Dienst
Pollution control in the city of Hamburg, 9:10002 (R;DE;In German)

Hanford Engineering Development Lab., Richland, WA (USA)
Comparison of activation in STARFIRE and MARS first-walls, 9:11293 (R;US)
Dependence on displacement rate of radiation-induced changes in microstructure and tensile properties of AISI 304 and 316, 9:10232 (R;US)
Development of a large lithium coolant system for operation under vacuum, 9:11294 (R;US)
Effects of HFIR irradiation at 55°C on the microstructure and toughness of HT-9 and 9Cr-1Mo, 9:10229 (R;US)
Evaluation of ferritic alloy Fe-2 1/4Cr-1Mo after neutron irradiation - irradiation creep and swelling, 9:10230 (R;US)
Fractographic examination of HT-9 miniature compact tension specimens tested at low temperatures, 9:10227 (R;US)

Lithium shell effect and its impact on microscopy determinations of swelling behavior, 9:10231 (R;US)
LWR pressure vessel surveillance dosimetry improvement program. Quarterly progress report, January 1983-March 1983. Volume 1, 9:9838 (R;US)
Spent fuel cladding containment credit test, 9:9478 (R;US)
Swelling in several commercial alloys irradiated to very high neutron fluence, 9:10228 (R;US)

Harry Diamond Labs., Washington, DC (USA)
High performance fiber optic telemetry link for use in a space radiation simulator. Technical report, 9:10625 (R;US)

Hart (Fred C.) Associates, Inc., Washington, DC (USA)
Evaluation of the large scale computing needs of the energy research program and how to meet them. Final report, 9:11370 (R;US)

Harvard Univ., Cambridge, MA (USA)
Alternative mechanisms for drawing down the Strategic Petroleum Reserve: forward-based markets compared with auction-only mechanisms, 9:9338 (R;US)
Optimization of transparent electrode for solar cell and chemical vapor deposition of amorphous silicon. Final technical report, 15 September 1980-30 March 1983, 9:9612 (R;US)
Stockpile coordination project. Harvard Energy Security Program. Final report, 9:10025 (R;US)

Hawaii State Government, Honolulu (USA)
Hawaii Non-Pilot States Program for the National Energy Extension Service. Final report, 9:10055 (R;US)

Hawaii Univ., Honolulu (USA). Dept. of Animal Science
Comparison of remotely acquired deep-body and subdermal temperature measurements for detecting fever in cattle, 9:10771 (R;US)

Hawaii Univ., Honolulu (USA). Office of Research Administration
Mid-Pacific Research Laboratory annual report, October 1, 1982-September 30, 1983, 9:10706 (R;US)

Heery Energy Consultants, Inc., Atlanta, GA (USA)
Georgia Power Corporate Headquarters solar system. Final construction status report, 9:9697 (R;US)

Heidelberg Univ. (Germany, F.R.). Physikalisches Inst.
β-decay asymmetry of the free neutron, 9:11052 (R;US)

Hendrickson Corp., Washington, DC (USA)
Household impacts of gasoline decontrol, 9:9980 (R;US)

Hessischer Minister fuer Landesentwicklung, Umwelt, Landwirtschaft und Forsten, Wiesbaden (Germany, F.R.)
Clean air program for the Rhine-Main area, 9:10696 (R;DE;In German)

Hungarian Academy of Sciences, Budapest. Central Research Inst. for Physics
DUAL-PROCESS, a highly reliable process control system, 9:9855 (R;HU)
Neutron sensitivity studies of LiF and $CaSO_4$ thermoluminescent detectors, 9:10594 (R;HU;In Hungarian)
Schwinger model in temporal gauge, 9:11110 (R;HU)
Self-focusing in laser produced spark, 9:11315 (R;HU)
Self-focusing of laser beam crossing a laser plasma, 9:11314 (R;HU)
Solar wind stagnation near comets, 9:10977 (R;HU)
Stochastic aspects of two-dimensional vibration diagnostics, 9:9856 (R;HU)
Studies to the stochastic theory of the coupled reactor kinetic-thermohydraulic systems Pt. 1. Space dependent model with one variable, 9:9833 (R;HU)
Theoretical and experimental studies of the efficiency of a solid-state track detector utilizing (neutron, alpha) reactions, 9:10595 (R;HU;In Hungarian)

I

IBM Research Div., Yorktown Heights, NY (USA)
Elastic theory of the defect solid solution, 9:11161 (R;US)

Idaho National Engineering Lab., Idaho Falls (USA)
Parallel processing algorithms for hydrocodes on a computer with MIMD architecture (DENELCOR's HEP), 9:9885 (R;US)

Idaho State Office of Energy, Boise (USA)
DOE/EES non-pilot grant final program report, 9:10175 (R;US)

Idaho Univ., Moscow (USA). Dept. of Electrical Engineering
Instrument failure detection in nonlinear systems, 9:10629 (R;US)

Ifo-Institut fuer Wirtschaftsforschung, Muenchen (Germany, F.R.). Projektgruppe Energie, Rohstoffe, Technologie
Effects of investments on energy consumption in industry, 9:9983 (R;DE;In German)
Quantitative effects of energy conservation policy in the Federal Republic of Germany. Assessment of energy savings through 1985, 9:10019 (R;DE;In German)
Quantitative effects of energy conservation policy in the Federal Republic of germany. Assessment of energy savings through 1985, 9:10020 (R;DE;In German)

Illinois Dept. of Energy and Natural Resources, Springfield (USA)
Illinois land report: Rice Lake Conservation Area. Volume 1. Final document, 9:9286 (R;US)
Illinois land report: Rice Lake Conservation Area. Volume 2. Comments and responses, appendices, references. Final report, 9:10723 (R;US)

Illinois Univ., Chicago (USA)
CO_2 emission tax policy: a sensitivity analysis, 9:9986 (R;US)

Illinois Univ., Urbana (USA)
Vaporized wall material/plasma interaction during plasma disruption, 9:11188 (R;US)

Illinois Univ., Urbana (USA). Dept. of Mechanical and Industrial Engineering
Residential and commercial cogeneration systems assessment. Final report Mar 1982-Jun 1983, 9:10149 (R;US)

Illinois Univ., Urbana (USA). Materials Research Lab.
Science of materials. Progress report, January 1-December 21, 1982, 9:10198 (R;US)

Imperial Coll. of Science and Technology, London (UK)
Report to SOTEAG (Shetland Oil Terminal Environmental Advisory Group) on salt marsh monitoring around Sullom Voe in 1981, 9:9347 (R;US)

Institute for Energy Technology, Kjeller (Norway)
Dependency models and probability of joint events, 9:9889 (R;NO)
Methods of RECORD, an LWR fuel assembly burnup code, 9:9847 (R;NO)
Shielding factors for typical houses in the Nordic countries, 9:11398 (R;NO)

Institute of Gas Technology, Chicago, IL (USA)
Combustion characteristics of fine-ground coal, 9:9305 (R;US)
Disposal of solid wastes with simultaneous energy recovery, 9:10167 (R;US)
Evaluation of NO/sub x/ emissions on a pilot-scale furnace, 9:9413 (R;US)
Fluidization behavior of sticky particles, 9:10459 (R;US)
Study of the behavior of gas distribution equipment in hydrogen service. Phase II. Project 65022 final report, April 26, 1979-June 26, 1980, 9:9384 (R;US)
Technology for improved energy utilization in metal heat-treating operations, 9:10137 (R;US)

Institut Max von Laue - Paul Langevin, 38 - Grenoble (France)
Annual report 1982, 9:10000 (R;FR)
Annual report 1982. Annex, 9:10001 (R;FR)
β-decay asymmetry of the free neutron, 9:11052 (R;US)
Time reversal invariance in polarized neutron beta decay, 9:11086 (R;US)

International Atomic Energy Agency, Seibersdorf (Austria). Laboratories
Report on intercomparison A-13 of the determination of trace elements in freeze dried animal blood, 9:10770 (R;XA)
Report on intercomparison V-9 of the determination of trace elements in cotton cellulose, 9:10769 (R;XA)

International Atomic Energy Agency, Vienna (Austria)
Characteristics of radioactive waste forms conditioned for storage and disposal: Guidance for the development of waste acceptance criteria. Report by an advisory group meeting on conditioning requirements for storage and disposal of radioactive wastes organized by the IAEA and held in Vienna, 23-27 August 1982, 9:9479 (R;XA)
Characterization of sporozoite surface antigens of Plasmodium falciparum, using monoclonal antibodies. Part of a coordinated programme on the preparation of irradiated vaccines against some human diseases. Final report for the period 1 October 1980 - 31 August 1982, 9:10836 (R;XA)
Fate and persistence of ^{14}C pesticide residues in different soils: effects of ^{14}C pesticide contaminated run-off soil water on biological systems. Part of a coordinated programme on isotopic-tracer-aided studies of agrochemical residue - soil biota

interactions. Final report for the period 1 August 1977 - 31 August 1982, 9:10837 (R;XA)
Guide on a national system for collecting, assessing and disseminating information on safety-related events in nuclear power plants. A pre-publication working document, 9:9888 (R;XA)
Interaction of pesticides and microorganisms in aquatic ecosystems. Part of a coordinated programme on isotopic-tracer-aided research and monitoring on agricultural residue-biological interactions in aquatic ecosystems. Final report for the period 1 November 1980 - 30 June 1982, 9:10741 (R;XA)
Isotope characterization of the water vapour in the Amazon region. Final report for the period 1 August 1979 - 31 July 1982, 9:10642 (R;XA)
Non-destructive multielement analysis of airborne particulates by means of instrumental neutron activation method. Final report for the period 1 December 1975 - 28 February 1981, 9:10314 (R;XA)
Nuclear risk assessment and public acceptance. Final report for the period 1 December 1979-30 November 1982, 9:9968 (R;XA)
Perceived risk of nuclear and hydro electrical power generation in Colombia. Final report for the period 1 July 1980-31 January 1983, 9:9969 (R;XA)
Persistence of organophosphorus pesticides in aquatic environments. Coordinated programme on isotope-tracer-aided research and monitoring on agricultural residue - biological interactions in aquatic environment. Final report for the period 1 July 1976 - 31 July 1982, 9:10740 (R;XA)
Radioisotope tracer application in surface and groundwater flow measurements. Final report for the period 1 January 1979 - 30 September 1982, 9:10953 (R;XA;In Russian)
Regional and global environmental behaviour of radionuclides from the nuclear fuel cycle. Report of the advisory group meeting on pathways for radionuclide releases of regional and world-wide interest organized by the IAEA held in Vienna, 2-5 June 1981, 9:10686 (R;XA)
Research within the coordinated programme on comparison of methods of "age" determination of ground water based on decay of long-lived radioisotopes, especially 32-Si. Final report for the period 1 June 1979 - 31 January 1982, 9:10954 (R;XA)
Study of radionuclides interaction with hydrophytocenosis. Part of a coordinated programme on isotopic-tracer-aided research and monitoring on agricultural residue-biological interactions in aquatic ecosystems. Final report for the period 1 January 1977 - 3 June 1982, 9:10848 (R;XA)
Use and maintenance of nuclear medicine instruments in Southeast Asia. Results of a survey conducted by the Medical Applications Section of the IAEA, 9:10796 (R;XA)
Utilization of particle fuels in different reactor concepts. Survey of world experience, 9:9846 (R;XA)
Waste management research abstracts no. 14, 9:9480 (R;XA)

International Centre for Theoretical Physics, Trieste (Italy)
Abrupt onset of scaling violation, 9:11071 (R;XA)
Analytical examination of distortions in power spectra due to sampling errors, 9:11378 (R;XA)
Approach towards minimality - supersymmetry at the preonic or pre-preonic level, 9:11085 (R;XA)
Avoiding domain wall problem in SU(N) grand unified theories, 9:11099 (R;XA)
Broken supersymmetries in high energy physics, 9:11084 (R;XA)
Class of simple solutions of the SU(2) Yang-Mills equations, 9:11101 (R;XA)
Derivation of the conventional basis for the classical Lie algebra generators, 9:11093 (R;XA)
Extension of Hsup(p) functions in polydiscs, 9:11377 (R;XA)
Fermion mass ratios and low energy grand unification, 9:11104 (R;XA)
Finite temperature SU(2) gauge theory with external magnetic field, 9:11095 (R;XA)
Formula relating infinitesimal Backlund transformations to hierarchy generating operators, 9:11380 (R;XA)
Gauge bosons as composites of fermions, 9:11070 (R;XA)
Generalized virial relations and the theory of subdynamics, 9:11165 (R;XA)
High-energy pp and p-barp scattering and the model of geometric scaling, 9:11076 (R;XA)
Lepton and quark families as quantum-dynamical systems, 9:11092 (R;XA)
Low mass-scale parity restoration in expanded gauge theories, 9:11105 (R;XA)
Magnetic monopoles and baryon decay, 9:11072 (R;XA)
Necessary and sufficient conditions of the optimality for hyperbolic systems with non-differentiable performance functional, 9:11381 (R;XA)
No domain wall problem in SU(N) grand unified theory, 9:11102 (R;XA)
Optimal control of distributed parameter system with incomplete information about the initial condition, 9:11376 (R;XA)
Perhaps a new unified scaling variable for describing the low- and high-psub(T) processes, 9:11075 (R;XA)
Physics with 100-1000 TeV accelerators, 9:11055 (R;XA)
Power estimation of sinusoids mounted upon dc background: Conditional problems, 9:11379 (R;XA)
Precocious unification in simple GUTS, 9:11100 (R;XA)
Quark approach to Santilli's conjecture on hadronic structure - II, 9:11073 (R;XA)
Ratio of lifetimes for the D^+ and D^0 mesons, 9:11074 (R;XA)
Renormalization of the QEMD of a dyon field, 9:11096 (R;XA)
Spontaneous compactification of a (4+d)-dimensional Kaluza-Klein theory into M_4xG/H for arbitrary G and H, 9:11094 (R;XA)
Stability domain of stationary solitons in a many-charge field model with non-Abelian internal symmetry, 9:11098 (R;XA)
Superconformal current multiplet, 9:11107 (R;XA)
Symmetry in Kaluza-Klein theory, 9:11167 (R;XA)
Towards a dynamical preon model, 9:11091 (R;XA)
Towards an effective bilocal theory from QCD in a background, 9:11097 (R;XA)
Trivial solution to the domain wall problem, 9:11103 (R;XA)
Uniqueness of the SU(2) instanton, 9:11106 (R;XA)
Unity behind diversity in nature, 9:11069 (R;XA)
Value preserving quantum measurements: impossibility theorems and lower bounds for the distortion, 9:11166 (R;XA)
Vector-valued measure and the necessary conditions for the optimal control problems of linear systems, 9:11375 (R;XA)

International Energy Agency Coal Research, London (UK)
Coal research projects - North and South America, 9:9219 (R;US)
Combustion of coal liquid mixtures, 9:9304 (R;GB)

International Energy Associates Ltd., Washington, DC (USA)
Materials licensing study, Phase 1. Volume 2. Findings and recommendations, 9:9523 (R;US)

International Inst. for Applied Systems Analysis, Laxenburg (Austria)
Water demand for generating electricity: a mathematical programming approach with application in Poland, 9:9763 (R;US)

International Test and Evaluation Team, Almeria (Spain)
Thermal losses of the sodium storage vessels of the Central Receiver System. IEA Small Solar Power Systems Project technical report No. 7/83, 9:9683 (R;US)

J

Japan Atomic Energy Research Inst., Tokai, Ibaraki. Tokai Research Establishment
Evaluation of neutron nuclear data for ^{12}C, 9:11118 (R;JP)

JAYCOR, Alexandria, VA (USA)
Polarization studies in electron cyclotron heating experiments on the Versator II tokamak. Final report 25 Aug 1980 - 25 Aug 1981, 9:11182 (R;US)

Jet Propulsion Lab., Pasadena, CA (USA)
Advanced photovoltaic module costing manual, 9:9589 (R;US)

Johns Hopkins Univ., Laurel, MD (USA). Applied Physics Lab.
Human reactions to ELF electric and magnetic fields: an annotated bibliography of current literature (3rd edition). Final report, 9:10946 (R;US)

Joint Inst. for Nuclear Research, Dubna (USSR)
Multiquark interactions and quantum chromodynamics, 9:11050 (R;SU)

Joint Inst. for Nuclear Research, Dubna (USSR). Dept. of Radiation Safety
Analytic expression for some dosimetric characteristics of neutrons and protons, 9:11156 (R;SU;In Russian)

Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Computing Techniques and Automation
Asymptotic behaviour of the scattering phase for non-trapping metrics, 9:11113 (R;SU)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of High Energy
Some methodical problems of processing events with V^0-particles in the propane bubble chamber exposed to carbon nuclei, 9:10587 (R;SU;In Russian)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Neutron Physics
Controller of multichannel pulse analyzer in CAMAC system, 9:10630 (R;SU;In Russian)
Fast multiwire proportional chambers for low-background separation of muon stops in a liquid tritium tarqet, 9:10590 (R;SU;In Russian)
Measurement of differential cross sections of neutron scattering with nuclei on the IBR-30 reactor, 9:9854 (R;SU;In Russian)
Method for improvement of gamma-transition cascade spectra amplitude resolution by computer processing of coincidence codes, 9:10592 (R;SU;In Russian)
System for monitoring the IBR-2 pulsed reactor power for the experiments during the reactor operating start-up, 9:9866 (R;SU;In Russian)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Nuclear Problems
Data readout system for the "Hyperon" spectrometer proportional chambers based on the K405KhP1 hydrid microcircuit, 9:10588 (R;SU;In Russian)
Large-aperture gas Cherenkov counter with wave shifter, 9:10589 (R;SU;In Russian)
Some methodical problems of processing data from one meter propane bubble chamber, 9:10586 (R;SU;In Russian)
500x500x40 mm threshold Cherenkov counter with the radiator of amino-G-acid aqueous solution, 9:10591 (R;SU;In Russian)
Joint Inst. for Nuclear Research, Dubna (USSR). Lab. of Theoretical Physics
Proper time, spatial distances and clock synchronization in the locally anisotropic space-time, 9:11174 (R;SU)
JRB Associates, Inc., McLean, VA (USA)
Active Program Research Requirements (APRR). Volume II. Appendix A. Cost Catalog. Final report, 9:9703 (R;US)
Jysk-Fynske Elsamarbejde (ELSAM), Fredericia (Denmark)
Wind turbine parks. Analysis of sites, 9:9755 (R;DK;In Danish)

K

Kansas Water Resources Research Inst., Manhattan (USA)
Movement of water and nitrate-nitrogen in a typical silt loam soil of western Kansas. Report for 1 Jul 1980-Sep 1982, 9:10707 (R;US)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Bibliothek
Publications of the University of Karlsruhe (T.H.) and the Nuclear Research Center Karlsruhe 1981, 9:11361 (R;DE;In German)
Karlsruhe Univ. (T.H.) (Germany, F.R.). Fakultaet fuer Maschinenbau
Heat and mass transfer in turbulent boundary layers along evaporating rippled water films, 9:10428 (R;DE;In German)
Keele Univ. (UK)
Observations of the interstellar ice grain feature in the Taurus molecular clouds, 9:10978 (R;US)
Kennedy (Bobby W.), Arab, AL (USA)
Do-it-yourself guideline for constructing a solar alcohol distillation system, 9:9549 (R;US)
Kennedy (Bobby W.), Guntersville, AL (USA)
Solar alcohol distillation system. Final report, Septemer 29, 1980-January 31, 1982, 9:9548 (R;US)
Kentucky Dept. of Energy, Lexington (USA)
Market analyses relative to the Renewable Energy, Inc. ethanol plant feasibility study, 9:9545 (R;US)
Kernforschungszentrum Karlsruhe G.m.b.H. (Germany, F.R.). Literaturabteilung
Publications of the University of Karlsruhe (T.H.) and the Nuclear Research Center Karlsruhe 1981, 9:11361 (R;DE;In German)
Kramer, Chin, and Mayo, Inc., Juneau, AK (USA)
Role of electric power in the southeast Alaska energy economy. Phase II. 1981 Juneau energy balance, 9:10034 (R;US)
Kreditanstalt fuer Wiederaufbau, Frankfurt am Main (Germany, F.R.)
Energy problems of the developing countries, 9:9970 (R;DE;In German)

L

Lake Shore Cryotronics, Inc., Westerville, OH (USA)
Enthalpy - improved dielectric insulation for superconducting wires. Final report Jun 1980-Mar 1982, 9:10396 (R;US)
Landbouwhogeschool Wageningen (Netherlands)
Monoclonal antibodies to Herpes Simplex Virus Type 2, 9:10802 (R;NL)
Lawrence Berkeley Lab., CA (USA)
Chiral anomalies and differential geometry, 9:11087 (R;US)
Coal-fueled diesel engines, 9:10197 (R;US)
Considerations involved in the design of negative-ion-based neutral beam systems, 9:11324 (R;US)
Earth Sciences Division annual report, 1982, 9:9729 (R;US)
Elastic theory of the defect solid solution, 9:11161 (R;US)
Fatigue resistance and microstructure of experimental dual phase Fe/2Si/0.1C steel, 9:10241 (R;US)
Formation of H^- by charge transfer in alkaline-earth vapors, 9:11322 (R;US)
Growth and characterization of single crystal (Cd, Zn)S thin films relevant to the study of the (Cd, Zn)S/Cu/sub x/S photovoltaic cell, 9:9599 (R;US)
H^- production from different metallic converter surfaces, 9:11323 (R;US)
Interactive parallel processor for data analysis, 9:10608 (R;US)
Lie algebraic methods for particle tracking calculations, 9:10494 (R;US)
Local structure of manganese in the photosynthetic apparatus and superoxide dismutase: an x-ray absorption study, 9:10772 (R;US)
Meson radiation from quark-gluon plasma, 9:11081 (R;US)
Molecular ion photofragment spectroscopy, 9:10380 (R;US)
Molecular surface science of heterogeneous catalysis. History and perspective, 9:10240 (R;US)
Multiplication of processing capacity with a parallel processor array, 9:11384 (R;US)
Numerical simulation of flame propagation in a closed vessel, 9:10391 (R;US)
Operation of a computer aided drafting system: improvements, results and hopes, 9:11385 (R;US)
Plastic box: a 4π detector for intermediate energy heavy ion physics, 9:10609 (R;US)
Reversible intercalation of graphite by fluorine and related synthetic and thermodynamic studies, 9:10297 (R;US)
Search for right-handed currents in muon decay, 9:11057 (R;US)
Seismic Safety Guide, 9:10443 (R;US)
Solid electrolyte degradation: problems and solutions, 9:9955 (R;US)
Some nitrogen-14 NMR studies in solids, 9:10350 (R;US)
Status of the Lawrence Berkeley Laboratory and the Lawrence Livermore National Laboratory (LLNL) free electron laser (FEL). Revision 1, 9:10496 (R;US)
Technology of high luminosity detectors, 9:10610 (R;US)
Thermodynamic coupling of heat and matter flows in near-field regions of nuclear waste repositories, 9:9482 (R;US)
Use of phase transformations in the design of alloy steel, 9:10239 (R;US)
Lawrence Livermore National Lab., CA (USA)
Alterant geophysical tomography, 9:10963 (R;US)
Application of positron annihilation, electron paramagnetic resonance and thermogravimetric techniques to the study of uranium oxidation, 9:10247 (R;US)
BAGI: a new concept for detecting and tracking hazardous gases, 9:10336 (R;US)
Calculation of density profiles in tandem mirrors fueled by pellets, 9:11334 (R;US)
Code ALICE B and B: a precompound/evaporation fission code emphasizing neutron yields, 9:11143 (R;US)

Comparisons of hydrodynamic beam models with kinetic treatments. Revision 1, 9:10497 (R;US)
Computer assessment of electromagnetic means of detecting approaching cruise missiles, 9:10454 (R;US)
Concentrations of copper-binding proteins in livers of bluegills exposed to increased concentrations of soluble copper, 9:10931 (R;US)
Corrosion test plan to guide canister material selection and design for a tuff repository, 9:10246 (R;US)
Coyote series data report LLNL/NWC 1981 LNG spill tests dispersion, vapor burn, and rapid-phase-transition. Volume 1, 9:9373 (R;US)
Cytogenetic characterization of the CHO mutant EM9, 9:10773 (R;US)
Development of soft x-ray streak cameras at Lawrence Livermore National Laboratory, 9:11248 (R;US)
Electric air filtration: theory, laboratory studies, hardware development, and field evaluations, 9:10473 (R;US)
End cell I & C requirements for operating tandem mirror reactors, 9:11185 (R;US)
Feasibility studies of a carbon/oxygen logging tool for evaluating the CO_2 content of the medium in nuclear device containment, 9:10635 (R;US)
Flow visualizations, velocity measurements, and surface convection measurements in simulated 20.8-cm Nova box amplifier cavities, 9:11331 (R;US)
Generalization of the numerical Schwarz algorithm, 9:11392 (R;US)
Generation of H^-, D^- ions on composite surfaces with application to surface/plasma ion source systems, 9:11336 (R;US)
Heat conduction analog model of urban fire spread, 9:11399 (R;US)
High frequency acoustic instabilities in heated fluids, 9:11048 (R;US)
Initial simultaneous Thomson-scattering measurements in the TMX-U tandem mirror, 9:11247 (R;US)
Intense positron beams: linacs. Preworkshop copy, 9:9530 (R;US)
Mechanical Engineering Research Program. Quarterly progress report, April-June 1983, 9:10441 (R;US)
MFTF-B quasi-optical ECRH transmission system, 9:11338 (R;US)
Modeling antennas near to and penetrating a lossy interface, 9:10457 (R;US)
Monte-Carlo calculations of forward directed bremsstrahlung produced by 20 and 45 MeV electrons on tungsten, 9:11148 (R;US)
NOVA laser facility for inertial confinement fusion, 9:11337 (R;US)
Numerical simulations of compliant material response to turbulent flow, 9:10431 (R;US)
Partitioning of copper among copper-binding proteins in the mussel Mytilus edulis exposed to soluble copper, 9:10935 (R;US)
Physical modeling of EM propagation over nonhomogeneous terrain, 9:10456 (R;US)
Pressure drop considerations of a lithium cooled fusion breeder tokamak reactor blanket, 9:11333 (R;US)
Probability problems in seismic risk analysis and load combinations for nuclear power plants, 9:9916 (R;US)
Radiation-induced electrical breakdown of helium in fusion reactor superconducting magnet systems, 9:11339 (R;US)
Reconnection in Spheromak formation and sustainment, 9:11341 (R;US)
Reevaluation of ENDL of σ(n,f) and anti nu/sub p/ for ^{235}U and ^{239}Pu from 100 keV to 20 MeV, 9:11139 (R;US)
Review of the impact of copper released into freshwater environments, 9:10742 (R;US)
Seismic review of vault for MFTF upgrade project, 9:11332 (R;US)
Seismic upgrade of Building 311, 9:10406 (R;US)
Status of the Lawrence Berkeley Laboratory and the Lawrence Livermore National Laboratory (LLNL) free electron laser (FEL). Revision 1, 9:10496 (R;US)
Study of parameters important to soil-structure interaction in seismic analyses of nuclear power plants, 9:9915 (R;US)
Summary of computational support and general documentation for computer code (GENTREE) used in Office of Nuclear Waste Isolation Pilot Salt Site Selection Project, 9:9492 (R;US)
Superconducting (radiation hardened) magnets for mirror fusion devices, 9:11340 (R;US)
Three-dimensional graphics for scientific data display and analysis, 9:10308 (R;US)
USI A-40 value/impact assessment, 9:9910 (R;US)
Vacuum outgassing of various materials, 9:10445 (R;US)
Volume generation of negative ions in high density hydrogen discharges, 9:11335 (R;US)

Lehigh Univ., Bethlehem, PA (USA). Dept. of Chemistry
Determination of the surface reactivity of coal powders. Fifth quarterly report, September 1, 1983-November 30, 1983, 9:9262 (R;US)

Linkoeping Univ. (Sweden). Dept. of Mechanical Engineering
Strategy for optimization of wind energy systems, 9:9752 (R;SE)

Linkoeping Univ. (Sweden). Matematiska Institutionen
Formal specification and implementation of operations in information management systems, 9:11397 (R;SE)

Little (Arthur D.), Inc., Cambridge, MA (USA)
Assessment of internal combustion engines as drivers for heat pumps. Final report, 9:10072 (R;US)
Catalog of selected heavy duty transport energy management models, December 1982-November 1983, 9:10131 (R;US)

Los Alamos National Lab., NM (USA)
Comparison of remotely acquired deep-body and subdermal temperature measurements for detecting fever in cattle, 9:10771 (R;US)
Computer simulation of reconnection in planetary magnetospheres, 9:10985 (R;US)
Cray/VAX interactive graphics system, 9:11383 (R;US)
Current sensing in magnetic fusion experiments by Faraday rotation in single-mode optical fibers, 9:11229 (R;US)
Development of CO_2 and KrF gas lasers as drivers for inertial confinement fusion, 9:11317 (R;US)
Development of the VLS process for SiC whisker growth, 9:10271 (R;US)
Electrical design of a high current density air-core reversed-field pinch ZTP, 9:11320 (R;US)
Experiment in benchmarking database systems, 9:11396 (R;US)
Family of almost periodic Schroedinger operators, 9:11175 (R;US)
Gaseous fuel safety assessment for light-duty automotive vehicles, 9:10196 (R;US)
Interactive benchmark comparison between a VAX 11/780 and a VAX 11/782, 9:11382 (R;US)
Little Boy replication: justification and construction, 9:10638 (R;US)
Los Alamos National Laboratory/New Mexico State University filter plugging test facility: description and preliminary test results, 9:10472 (R;US)
Los Alamos real-time and digital radiography plans, 9:10631 (R;US)
Magnetic field topologies of the relaxed states of turbulent discharges, 9:11316 (R;US)
Observations of the interstellar ice grain feature in the Taurus molecular clouds, 9:10978 (R;US)
Particle and field signatures of substorms in the near magnetotail, 9:10986 (R;US)
Particulate oil shale inhalation and pulmonary inflammatory response in rats, 9:10926 (R;US)
Pattern formation by shock processes, 9:11046 (R;US)
Plasma engineering design of a compact reversed-field pinch reactor (CRFPR), 9:11321 (R;US)
Poloidal field system design for the ZT-H reversed field pinch experiment, 9:11318 (R;US)
Reference materials for nondestructive assay of special nuclear material. Volume 2. Thin metal foils of highly enriched uranium, 9:9524 (R;US)
Safeguards and security. Progress report, August 1982-January 1983, 9:9521 (R;US)
Semigroup associated with a quasi-linear system in which the coupling is linear, 9:11181 (R;US)
Simulation of betatron-synchrotron coupling, 9:10493 (R;US)
Stability of planar multifluid plasma equilibria by Arnold's method, 9:11047 (R;US)
Stark spectroscopy of hydrogen lines in turbulent plasma. 1. Low-frequency turbulence, 9:11250 (TG;US)
Studies of altered vitrophyre for the prediction of nuclear waste repository - induced thermal alteration at Yucca Mountain, Nevada, 9:9481 (R;US)
Study of turbulence of plasma of a rapid linear theta-pinch according to the Stark broadening of the spectral lines of deuterium, 9:11251 (TG;US)

Time reversal invariance in polarized neutron beta decay, 9:11086 (R;US)
Toroidal magnetic field system for a 2-MA reversed-field pinch experiment, 9:11319 (R;US)
Louisiana Geological Survey, Baton Rouge (USA)
Louisiana peat resources. Final technical report, 1 April 1981-15 April 1983, 9:9289 (R;US)
Louisiana State Univ., Baton Rouge (USA). Dept. of Geology
Subsidence in coastal Louisiana: causes, rates, and effects on wetlands, 9:10727 (R;US)
Louisiana Universities Marine Consortium, Chauvin (USA)
Subsidence in coastal Louisiana: causes, rates, and effects on wetlands, 9:10727 (R;US)
Lund Univ. (Sweden). Dept. of Obstetrics and Gynaecology
Malignant tumours of the vulva. A study of the effects of radiotherapy, surgery and cho-emotherapy in combination or used alone, 9:10804 (R;SE)
Lund Univ. (Sweden). Dept. of Orthopaedics
Femoral head vitality after intracapsular hip fracture. 490 cases studied by intravital tetracyclic labeling and Tc-MDP radionuclide scintimetry, 9:10803 (R;SE)
Lund Univ. (Sweden). Fysiska Institutionen
Production of negative ion beams by charge exchange at the 3UDH Pelletron accelerator in Lund; ion-optical calculations for different geometries, 9:10516 (R;SE;In Swedish)
Lund Univ. (Sweden). Institutionen foer Astronomi
Physical processes in young supernovae, 9:10979 (R;SE;In Swedish)

M

Mannheim Univ. (Germany, F.R.). Fakultaet fuer Volkswirtschaftslehre und Statistik
Supply response of resource extracting firms to pre-announced price changes, 9:9981 (R;DE)
Manville Service Corp., Denver, CO (USA)
Acoustical benefits resulting from insulation and air leakage control in family housing units. Final report Jul 1981-Sep 1982, 9:10056 (R;US)
Marburg Univ. (Germany, F.R.). Fachbereich Geowissenschaften
Electron density distribution in α-oxalic acid dihydrate. An X-ray and neutron scattering investigation at low temperatures, 9:10294 (R;DE;In German)
Maryland Univ., Baltimore (USA)
Assessment of health and environmental effects of energy sources. Final report, 9:10640 (R;US)
Maryland Univ., College Park (USA)
Lie algebraic methods for particle tracking calculations, 9:10494 (R;US)
Preservation of fresh solid foods by gas exchange. Final report of Phase I, 9:10138 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA)
Control of molting in crustacea, 9:10763 (R;US)
Implementation of MACLISP on a large address space computer. Final report, 9:11369 (R;US)
Modeling of lithium and lithium-lead reactions in air using LITFIRE, 9:11325 (R;US)
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, November 30, 1982-November 29, 1983, 9:9593 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Dept. of Nutrition and Food Science
Comparative mutagenesis of human cells in vitro and in vivo. Progress report and financial statement, 9:10768 (R;US)
Massachusetts Inst. of Tech., Cambridge (USA). Lab. for Computer Science
Introduction to NIL, 9:11373 (R;US)
NIL notes for release 0.259, 9:11372 (R;US)
Massachusetts Univ., Amherst (USA). Dept. of Mechanical Engineering
Investigation of the aerodynamics of horizontal-axis wind turbine rotors. Final technical report, 9:9745 (R;US)
Massachusetts Univ., Amherst (USA). Materials Research Lab.
Radiolysis of resist polymers. 1. Poly(methyl-alpha-haloacrylates) and copolymers with methylmethacrylate. Technical report, 9:10382 (R;US)
Radiolysis of resist polymers. III. Copolymers of methyl-alpha-chloroacrylate and trihaloethylmethacrylates. Technical report, 9:10383 (R;US)
Mathematica Policy Research, Inc., Washington, DC (USA)
Estimating household energy expenditures in the Phase I Comprehensive Human Resources Data System. Task 11 final report, 9:9978 (R;US)
Extending the CHRD System into a microanalytic model of the US economy: a literature review and preliminary design, 9:9979 (R;US)
Household impacts of gasoline decontrol, 9:9980 (R;US)
Mathtech, Inc., Princeton, NJ (USA)
Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 1. Final report, 9:10697 (R;US)
Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 4. Final report, 9:10699 (R;US)
Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 2. Final report, 9:10698 (R;US)
Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 6. Final report, 9:10701 (R;US)
Benefits analysis of alternative secondary national ambient air quality standards for sulfur dioxide and total suspended particulates. Volume 5. Final report, 9:10700 (R;US)
McDonnell Douglas Astronautics Co., St. Louis, MO (USA)
Reactor assessments of advanced bumpy torus configurations, 9:11278 (R;US)
McNeill (Robert L.), Albuquerque, NM (USA)
Offshore in-situ testing techniques, 1983, 9:9322 (R;US)
Meridian Corp., Falls Church, VA (USA)
Renewable Energy Program support. Final report, 9:9581 (R;US)
Metal Properties Council, Inc., New York (USA)
Corrosion of metals in coal liquefaction processes. Final report, 9:9223 (R;US)
Microstructural study of failure mechanisms during mechanical testing in coal gasification environments. Final report Mar 1980-Mar 1982, 9:9237 (R;US)
Miljoestyrelsen, Roskilde (Denmark). Luftforureningslab.
Numerical treatment of the advection-diffusion equation. Part 1. Space discretization, 9:10643 (R;DK)
Numerical treatment of the advection-diffusion equation. Part 4. Multilevel model, 9:10646 (R;DK)
Numerical treatment of the advection-diffusion equation. Part 5. Documentation of ADMO1, 9:10647 (R;DK)
Numerical treatment of the advection-diffusion equation. Pt. 6. Special treatment of the diffusion terms, 9:10648 (R;DK)
Numerical treatment of the advection-diffusion equation. Part 3. Time integration, 9:10645 (R;DK)
Numerical treatment of the advection-diffusion equation. Part 2. Test problems, 9:10644 (R;DK)
Zero/span control of monitors used in the Danish national airquality measurement program, 9:10659 (R;DK;In Danish)
Mineraloelwirtschaftsverband e.V., Hamburg (Germany, F.R.)
MWV annual report 1982, 9:9339 (R;DE;In German)
Minerals Management Service, Reston, VA (USA). Headquarters Office
Draft environmental impact statement: proposed polymetallic sulfide minerals lease offering, Gorda Ridge area offshore Oregon and northern California, 9:10757 (R;US)
Minicars, Inc., Goleta, CA (USA)
Minicars research safety vehicle program. Phase 3. Volume 1. Technical final report. Report for Jan 1977-Sep 1981, 9:10193 (R;US)
Minicars research safety vehicle program. Phase 3. Volume 2. Appendices. Final report Jan 1977-Sep 1981, 9:10194 (R;US)
Ministeriet for Groenland, Copenhagen (Denmark)
List of reports, etc. on hydroelectric power investigations in Greenland as of June 30, 1983, 9:9561 (R;DK;In Danish)
Minnesota Univ., Minneapolis (USA). Dept. of Mechanical Engineering
Modeling mesoscale diffusion and transport processes for releases within coastal zones during land/sea breezes, 9:9859 (R;US)
Minnesota Univ., Minneapolis (USA). Particle Technology Lab.
Instruments and techniques for dynamic particle size measurement of coal dust. Open file report 1 Dec 76-30 Nov 80, 9:9295 (R;US)

Mississippi State Univ., Mississippi State (USA). MHD Energy Center
Differential optical absorption techniques for diagnostics of coal gasification. Technical progress report, October, November, December 1982, 9:9260 (R;US)
Missouri Univ., Rolla (USA). Dept. of Electrical Engineering
Investigation of chemical spray and electrodeposition techniques for the growth of thin film CdTe solar cell materials. Final report, 9:9594 (R;US)
Mitre Corp., McLean, VA (USA)
Feasibility of in situ solidification/stabilization of landfilled hazardous wastes. Final report Nov 81- Mar 82, 9:10724 (R;US)
Mitre Corp., McLean, VA (USA). METREK Div.
Cost and market penetration analysis of selected fossil fueled electric power generating systems. Volume I. Draft final report, 9:10040 (R;US)
Mobil Solar Energy Corp., Waltham, MA (USA)
Stress studies in EFG. Quarterly progress report, July 1, 1983-September 30, 1983, 9:9598 (R;US)
Monsanto Research Corp., Miamisburg, OH (USA). Mound
Determination of Cr(VI) and Cr(III) by ICP, 9:10335 (R;US)
History of the Exxon coal liquefaction pilot plant component performance, 9:9235 (R;US)
Mound activities in chemical and physical research: January-June 1983, 9:9527 (R;US)
Mueller Associates, Inc., Baltimore, MD (USA)
Survey of alternative fuels for residential and commercial space heating. Final report, 9:10061 (R;US)
Muenchen Univ. (Germany, F.R.)
Systematic studies of the effect of aggressive gases on sprucewood, 9:10930 (R;DE;In German)
Muenchen Univ. (Germany, F.R.). Fachbereich Medizin
Studies of mercury content of indoor air, blood and urine in clinical and medical dental practice, 9:10929 (R;DE;In German)

N

Naemnden foer Energiproduktionsforskning, Stockholm (Sweden)
LDB-VAWT: Executive summary, 9:9754 (R;SE)
Storing of saplings of Salix spp, 9:9601 (R;SE;In Swedish)
National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center
Downsizing assessment of automotive Stirling engines, 9:10182 (R;US)
Evaluation of CO_2 and CO dopants in hydrogen to reduce hydrogen permeation in the Stirling engine heater heat tube alloy CG-27, 9:10183 (R;US)
Mod-2 wind turbine development, 9:9748 (R;US)
National Association of Home Builders of the United States, Washington, DC. Research Foundation
DOE/MASEC energy research house, Olathe, Kansas. Final report, 9:9699 (R;US)
National Bureau of Standards, Washington, DC (USA)
Factors affecting the soundness of blended cements, 9:10143 (R;US)
National Bureau of Standards, Washington, DC (USA). Center for Building Technology
Building technology publications. supplement 7: 1982. Final report, 9:10075 (R;US)
Evaluation of the daylight and energy performance of windows, skylights, and clerestories, 9:10074 (R;US)
Performance criteria for solar heating and cooling systems in residential buildings, 9:9704 (R;US)
National Bureau of Standards, Washington, DC (USA). Inst. for Applied Technology
Energy conservation through the facilitation of increased blended cement use, 9:10142 (R;US)
National Bureau of Standards, Washington, DC (USA). Radiation Physics Div.
Investigation of lyoluminescence techniques for application in radiation-protection dosimetry. Final report Jan 1980-Jan 1982, 9:10351 (R;US)
National Center for Devices and Radiological Health, Rockville, MD (USA)
Mammographic phantom evaluation project, 9:10805 (R;US)
National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.
20 atmosphere rig PFBC test results: Test 13, investigations into the use of two-stage air admission, 9:10462 (R;US)
20 atmosphere rig PFBC test results: Tests 14 and 15, investigations with a coarse coal-water mixture, 9:10463 (R;US)
National Engineering Lab. (NBS), Washington, DC (USA)
Possible contributions of cement and concrete technology to energy conservation, 9:10141 (R;US)
Residential Conservation Service installer's guide, 9:10082 (R;US)
National Fertilizer Development Center, Muscle Shoals, AL (USA)
Comparison of energy requirements for production of high-nitrogen mixed fertilizer by the nitrophosphate route with the urea-ammonium phosphate route, 9:10150 (R;US)
National Institutes of Health, Bethesda, MD (USA)
Control of molting in crustacea, 9:10763 (R;US)
National Oceanic and Atmospheric Administration, Idaho Falls, ID (USA). Air Resources Lab.
Idaho Field Experiment 1981. Volume 1. Experimental design and measurement systems, 9:10661 (R;US)
National Physical Lab., Teddington (UK)
Corrosion problems related to the containment of high-level nuclear waste for disposal, 9:9471 (R;GB)
National Radiological Protection Board, Harwell (UK)
Accidental releases of radionuclides: a preliminary study of the consequences of land contamination, 9:10712 (R;GB)
Radiological protection aspects of shallow land burial of PWR operating wastes, 9:9518 (R;GB)
National Swedish Board for Energy Source Development (NE), Stockholm
IEA Forestry Energy. Annual Report 1982, 9:9600 (R;SE)
National Veterinary Services Labs., Ames, IA (USA)
Comparison of remotely acquired deep-body and subdermal temperature measurements for detecting fever in cattle, 9:10771 (R;US)
Nauchno-Issledovatel'skij Inst. Atomnykh Reaktorov, Dimitrovgrad (USSR)
High temperature radiation-induced embrittlement of some alloys on refractory metal base, 9:10243 (R;SU;In Russian)
Service behaviour of 1Kh2M steel in steam generator of BOR-60 reactor, 9:10242 (R;SU;In Russian)
Nauchno-Issledovatel'skij Inst. Ehlektrofizicheskoj Apparatury, Leningrad (USSR)
Computer-graphics system for designing ion-optical systems of charged particle accelerators, 9:10482 (R;SU;In Russian)
Stark spectroscopy of hydrogen lines in turbulent plasma. 1. Low-frequency turbulence, 9:11250 (TG;US)
Study of turbulence of plasma of a rapid linear theta-pinch according to the Stark broadening of the spectral lines of deuterium, 9:11251 (TG;US)
Naval Civil Engineering Lab., Port Hueneme, CA (USA)
Fluidized bed air-to-air heat pump evaporator evaluation. Final report Oct 1982-Sep 19823 , 9:10058 (R;US)
Naval Postgraduate School, Monterey, CA (USA)
Powerplant selection for conceptual helicopter design. Master's thesis, 9:10127 (R;US)
Structure and behavior of vacuum plasma sprayed overlay coatings on nickel based superalloys. Master's thesis, 9:10203 (R;US)
Naval Research Lab., Washington, DC (USA)
Analytic models of magnetic field evolution in laser-produced plasma expansions. Memorandum report, 9:10637 (R;US)
Dielectric resonators for use in microwave and millimeter-wave gaas circuits. Memorandum report, 9:10448 (R;US)
Nevada Univ., Reno (USA)
Discovery and geology of the Desert Peak geothermal field: a case history. Bulletin 97, 9:9731 (R;US)
New Mexico State Univ., Las Cruces (USA). New Mexico Energy Inst.
Subsurface investigations for the area surrounding Tortugas Mountain, Dona Ana County, New Mexico, 9:9730 (R;US)
New Mexico Univ., Albuquerque (USA)
Lung cancer epidemiology in New Mexico uranium miners. First annual report, 1 April 1983-1 January 1984, 9:10845 (R;US)
New Mexico Univ., Albuquerque (USA). Dept. of Mechanical Engineering
Measured performance of a solar augmented heat pump/chiller system with thermal storage in tanks of stratified water, 9:9696 (R;US)

New York Sea Grant Inst., Albany (USA)
Marine biomass: New York State species and site studies. Annual report, December 1, 1981-November 30, 1982, 9:9602 (R;US)
New Zealand Energy Research and Development Committee, Auckland
Coal analysis in New Zealand, 9:9263 (R;NZ)
Energy conservation and oil substitution at a dairy company, 9:10144 (R;NZ)
Nickels Engineering, Inc., New Berlin, WI (USA)
Computer simulation of magnetic field circuits in ATF, 9:11269 (R;US)
North Carolina State Univ., Raleigh (USA). Dept. of Materials Engineering
Support for DOE program in mineral waste-form development, 9:9493 (R;US)
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Renewable energy resource planning in Orange County: a summary of procedures used for renewable assessment. Piedmont Cresent Energy Project, 9:10044 (R;US)
Northern States Power Co., Minneapolis, MN (USA)
BWR fuel bundle extended burnup program. Technical progress report, January 1982-December 1982, 9:9773 (R;US)
Northwestern Univ., Evanston, IL (USA)
Generation of H^-, D^- ions on composite surfaces with application to surface/plasma ion source systems, 9:11336 (R;US)
Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry
Characterization of supported iron catalysts during Fischer-Tropsch synthesis. Technical progress report, August 1, 1983-December 31, 1983, 9:9537 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Div. of Technical Information and Document Control
Nuclear Regulatory Commission issuances. Volume 18, No. 1, 9:9825 (R;US)
Nuclear Regulatory Commission issuances. Volume 18, No. 2, 9:9826 (R;US)
Title list of documents made publicly available, October 1-31, 1983. Vol. 5, No. 10, 9:9824 (R;US)
Title list of documents made publicly available, September 1-30, 1983. Volume 5, No. 9, 9:10011 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office for Analysis and Evaluation of Operational Data
Report to Congress on abnormal occurrences, April-June 1983. Vol. 6, No. 2, 9:9895 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Reactor Regulation
Safety evaluation report related to steam generator repair at H.B. Robinson Steam Electric Plant, Unit No. 2. Docket No. 50-261, 9:9902 (R;US)
Safety evaluation report related to the operation of LaSalle County Station, Units 1 and 2, (Docket Nos. 50-373 and 50-374). Supplement No. 7, 9:9897 (R;US)
Safety evaluation report related to the operation of WPPSS Nuclear Project No. 2, (Docket No. 50-397). Supplement No. 4, 9:9899 (R;US)
Safety evaluation report related to the operation of Limerick Generating Station, Units 1 and 2 (Docket Nos. 50-352-50-353). Supplement 1, 9:9900 (R;US)
Safety evaluation report related to the operation of Braidwood Station, Units 1 and 2 (Docket Nos. 50-456 and 50-457), 9:9901 (R;US)
Safety evaluation report related to the operation of Shearon Harris Nuclear Power Plant, Units 1 and 2. Docket Nos. STN 50-400 and STN 50-401, 9:9903 (R;US)
Safety evaluation report related to the operation of Wolf Creek Generating Staton, Unit No. 1, (Docket No. STN 50-482). Supplement No. 4, 9:9898 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Nuclear Regulatory Research
Staff analysis of public comments on proposed rule 10 CFR Part 60, Disposal of High-Level Radioactive Wastes in Geologic Repositories, 9:9483 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of Resource Management
Licensed operating reactors. Status summary report, data as of 7-31-83. Volume 7, No. 8, 9:10010 (R;US)
Licensed operating reactors: status summary report, data as of September 30, 1983. Volume 7, No. 10, 9:9771 (R;US)
Regulatory licensing: status summary report, November 1-30 1983. Volume 12, No. 11, 9:10013 (R;US)
Regulatory licensing: status summary report, October 1-31, 1983. Volume 12, No. 10, 9:10012 (R;US)
Summary information report. Volume 2, 9:9827 (R;US)
Systematic evaluation program. Status summary report. Volume 5, No. 10, 9:9896 (R;US)
Nuclear Regulatory Commission, Washington, DC (USA). Office of State Programs
Impacts of NRC programs on state and local governments, 9:9828 (R;US)

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Oak Ridge Associated Universities, Inc., TN (USA)
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Oak Ridge Gaseous Diffusion Plant, TN (USA)
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Army Civilian Personnel System (ACPERS): functional description. Automated Data Systems Manual, 9:11358 (R;US)
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FORAST: a regional scale study of forest responses to air pollutants, 9:10653 (R;US)
Fusion-relevant basic radiation effects: theory and experiment, 9:10219 (R;US)
High-temperature gas-cooled reactor safety studies for the Division of Accident Evaluation. Quarterly progress report, April 1-June 30, 1983. Volume 2, 9:9911 (R;US)
Industrial Safety and Applied Health Physics Division, annual report for 1982, 9:10951 (R;US)
Integrated palm oil processing, 9:9535 (R;US)
Integrating forest-stand simulations with paleoecological records to examine long-term forest dynamics, 9:10703 (R;US)
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National RF Test Facility as a multipurpose development tool, 9:11270 (R;US)
New vistas of heavy-ion reactions with the spin spectrometer, 9:10611 (R;US)
Nuclear power plant operating experience. Volume 1. Annual report, 1981, 9:10014 (R;US)
ORNL grouting technologies for immobilizing hazardous wastes, 9:9469 (R;US)
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Parametric system studies of candidate TF coil system options for the Tokamak Fusion Core Experiment (TFCX), 9:11272 (R;US)
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Quantitative and molecular analyses of mutation in a pSV2gpt transformed CHO cell line, 9:10843 (R;US)
Radiological assessment. A textbook on environmental dose analysis, 9:10691 (R;US)
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Resource materials developed in support of the residential conservation service rule issued on November 7, 1979, 9:10064 (R;US)
Role of toxicological interactions in chemical carcinogenesis, 9:10919 (R;US)
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Your home energy audit: the first step to more energy-efficient living, 9:10063 (R;US)

Oesterreichisches Forschungszentrum Seibersdorf G.m.b.H.
Concentration of heavy metals in water plants of some Austrian running waters, 9:10932 (R;AT;In German.)

Oesterreichisches Inst. fuer Raumplanung, Vienna
Land use survey for Austria - basic instrument to determine and to safeguard natural and economic resources in terms of land, especially with regard to energy recovery from biomass. 1st project stage, 9:9996 (R;AT;In German)

Office of Technology Assessment (U.S. Congress), Washington, DC
Energy efficiency of buildings in pities. Volume 2. Working papers. Paper No. 1. Fostering equity in urban conservation: utility metering and utility financing. Part 1. Utility metering. Part 2. Utility financing. Paper No. 2. Case studies of building energy efficiency in five U.S. cities: Buffalo, Des Moines, Jersey City, San Antonio, Tampa, 9:10076 (R;US)
Technologies and management strategies for hazardous waste control. Summary report, 9:9994 (R;US)

Oklahoma State Univ., Stillwater (USA)
Characterization and treatment of aqueous wastes and residue from petroleum refineries. Final report 1 Oct 79-30 Sep 82, 9:9346 (R;US)

Oklahoma Univ., Norman (USA). Energy Resources Inst.
System development/operation and data collection/reconcilation for forms EIA-23 and EIA-64A. Final closeout report, July 15, 1978-September 30, 1981, 9:9334 (R;US)
System development/operation and data collection/reconciliation for forms EIA-23 and EIA-64A. Final report: 1979 report year processing, May 15, 1980-May 15, 1981, 9:9335 (R;US)

Orleans Univ., 45 (France)
Ion and electron injection in ionosphere and magnetosphere. Application to the parallel electric field measurement in auroral zones, 9:10983 (R;FR;In French)

Owens-Illinois, Inc., Toledo, OH (USA)
Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1982-September 14, 1983, 9:10766 (R;US)

Oxford Univ. (UK). Nuclear Physics Lab.
Folding model analysis of alpha-particle elastic scattering with a semirealistic density dependent effective interaction, 9:11124 (R;US)
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Pacific Northwest Lab., Richland, WA (USA)
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Measurement of electron cyclotron emission on the T.F.R. Tokamak. Application to the study of disruptions, 9:11191 (R;FR;In French)

Paris-11 Univ., 91 - Orsay (France). Inst. de Physique Nucleaire
Cross section for inclusive deep inelastic scattering in the impulse approximation: scale invariance and mass problems, 9:11077 (R;FR;In French)
Neutron dose equivalent rates due to heavy ion beams, 9:11155 (R;FR)

Paris-11 Univ., 91 - Orsay (France). Lab. de l'Accelerateur Lineaire
High transverse momentum π^0 and direct photon photoproduction, 9:11056 (R;FR;In French)
Second order effects of a sextupolar field on betatron oscillations in a storage ring, 9:10563 (R;FR)
Techniques for longitudinal polarisation in electron storage rings, 9:10562 (R;FR)

Pennsylvania State Univ., University Park (USA). Coal Research Section
Data base for the analysis of compositional characteristics of coal seams and macerals. Technical progress report, August 1982-January 1983, 9:9261 (R;US)

Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering
Cation promotion effects in zeolite-supported F-T catalysts. First quarterly report, September-November 1983, 9:9538 (R;US)
Promotion effects on the synthesis of higher alcohols. Fifth quarterly report, September 1983-November 1983, 9:9547 (R;US)
Thermodynamic behavior of coal liquids in the presence of coal solids characterization of IOM and ash. First quarterly progress report, August 1-November 1, 1983, 9:9234 (R;US)

Pittsburgh Univ., PA (USA). Graduate School of Public Health
Noise attenuating properties of earmuffs worn by miners. Volume 2. Development of a laboratory procedure for the physical measurement of earmuff attenuation. Open file report 1 Jul 1979-30 Jun 1980, 9:10952 (R;US)
Noise attenuating properties of earmuffs worn by miners. Volume 1. Comparison of earmuff attenuation as measured by psychophysical and physical methods. Open file report (final) Jan-Oct 1979, 9:10702 (R;US)

Plank (Don), St. Petersburg, FL (USA)
Solar-powered postage stamp: an artist's energy statement, 9:9659 (R;US)

Podlasek (R.J.), Springfield, IL (USA)
Cogeneration systems reliability data base feasibility study. Final report Aug 1982-May 1983, 9:10016 (R;US)

Policy Planning and Evaluation, Inc., McLean, VA (USA)
Energy savings by recovered materials use in the copper industry , 9:10139 (R;US)

Portland Cement Association, Skokie, IL (USA). Construction Technology Labs.
Heat transfer characteristics of a low density concrete wall. Final report, 9:10073 (R;US)

Preston Polytechnic (UK). Div. of Physics and Astronomy
Observations of the interstellar ice grain feature in the Taurus molecular clouds, 9:10978 (R;US)

Princeton Univ., NJ (USA)
Cavity launchers for ICRF, 9:11292 (R;US)

Princeton Univ., NJ (USA). Plasma Physics Lab.
Analytic representation of three-dimensional stellarator field, 9:11326 (R;US)
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Purdue Univ., Lafayette, IN (USA). Dept. of Physics
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Purdue Univ., Lafayette, IN (USA). School of Mechanical Engineering
Laminarization effects on the dynamics of a disk levitated by incompressible fluid flow, 9:10424 (R;US)

Pyros, Inc., Gaithersburg, MD (USA)
Support service to the Office of Oil, Gas, Shale and Coal Liquids. Final report, 9:9218 (R;US)

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Review of shell-and-tube heat exchanger fouling and corrosion in geothermal power plant service, 9:9736 (R;US)

Radian Corp., Salt Lake City, UT (USA)
Control technology assessment of selected petroleum refinery operations, 9:9333 (R;US)

Radiation Monitoring Devices, Inc., Watertown, MA (USA)
Low cost, sprayed $CuInSe_2$ solar cell research. First annual progress report, September 15, 1982-September 15, 1983, 9:9595 (R;US)

Radiochemistry Consultant Group, Vaestra Froelunda (Sweden)
Small scale studies of production of fissium aerosols, 9:9913 (R;SE)

Rationalisierungsverband des Steinkohlenbergbaus, Essen (Germany, F.R.)
Economic association of the coal mining industry, 9:9290 (R;DE;In German)

Renewable Energy, Inc., Paducah, KY (USA)
Market analyses relative to the Renewable Energy, Inc. ethanol plant feasibility study, 9:9545 (R;US)

Rensselaer Polytechnic Inst., Troy, NY (USA)
Kinetic measurements on elementary fossil fuel combustion reactions over wide temperature ranges. Progress report, 1 May-31 December 1983, 9:10379 (R;US)

Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Materials Engineering
Application of positron annihilation, electron paramagnetic resonance and thermogravimetric techniques to the study of uranium oxidation, 9:10247 (R;US)

Rensselaer Polytechnic Inst., Troy, NY (USA). Dept. of Nuclear Engineering
Measurement of phase distribution phenomena in a triangular conduit, 9:10429 (R;US)

Research Consulting Associates, Lexington, MA (USA)
Windamper method of galloping control. Pt. I. Management overview. Final report, 9:9768 (R;US)
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Research Triangle Inst., Research Triangle Park, NC (USA)
North Carolina rate demonstration project. Blue Ridge Electric Membership Corporation. Volume II. Results and conclusions, 9:10068 (R;US)
North Carolina rate demonstration project. Carolina Power and Light Company study. Project library Part 2. Volume 2, 9:10125 (R;US)
North Carolina rate demonstration project. Carolina Power and Light Company study. Project library Part 3. Volume 2, 9:10126 (R;US)
North Carolina rate demonstration project. Carolina Power and Light Company study. Volume I. Design and implementation, 9:10069 (R;US)
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North Carolina Rate Demonstration Project: Carolina Power and Light Company study. Volume II. Results and conclusions, 9:10067 (R;US)
North Caroline rate demonstration project. Blue Ridge Electric Membership Corporation study. Project library. Volume 2, 9:10070 (R;US)

RE/SPEC, Inc., Rapid City, SD (USA)
Avery Island brine migration tests: installation, operation, data collection, and analysis, 9:10966 (R;US)

Rhode Island Univ., Kingston (USA). Dept. of Chemical Engineering
Study of multiphase flow useful to understanding scaleup of coal liquefaction reactors. Technical progress report, September 1-November 30, 1983, 9:9229 (R;US)

Rhode Island Univ., Narragansett (USA). Marine Geomechanics Lab.
Consolidation properties and stress history of some deep sea sediments, 9:10970 (R;US)

Rice Univ., Houston, TX (USA). Dept. of Mechanical Engineering
Metallurgical characterization of niobium/tin superconducting multifilamentary wires. Final report 1 Apr-31 Dec 1982, 9:10202 (R;US)

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Rochester Univ., NY (USA). Dept. of Microbiology
Inducible error-prone repair in B. subtilis. Progress report, May 1, 1983-April 30, 1984, 9:10844 (R;US)
Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group
Molten salt destruction of hazardous materials process and data update, 9:10654 (R;US)
Rockwell International Corp., Canoga Park, CA (USA). Energy Technology Engineering Center
Groundwater and geothermal: urban district heating applications, 9:9743 (R;US)
Rockwell International Corp., Canoga Park, CA (USA). Rocketdyne Div.
Coal slurry pump development. Fossil energy annual summary technical information report, 9:9224 (R;US)
Rogers, Golden and Halpern, Inc., Reston, VA (USA)
Gulf of Mexico summary report, 9:9327 (R;US)
Royal Inst. of Tech., Stockholm (Sweden). Dept. of Plasma Physics
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Royal Inst. of Tech., Stockholm (Sweden). Plasma Physics and Fusion Research
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Computer models for comparative assessment of cost and competitiveness of gas-fired space conditioning systems. Final report Jun 1981-Jun 1982, 9:10081 (R;US)
Savannah River Ecology Lab., Aiken, SC (USA)
Critical pathways of radionuclides to man from agro-ecosystems. Annual progress report, October 1981-September 1982, 9:10713 (R;US)
Science Applications, Inc., Boulder, CO (USA). Plasma Research Inst.
Magnetic fusion energy program. Final report, 9:11237 (R;US)
Tandem mirror coil optimization studies, 9:11330 (R;US)
Science Applications, Inc., La Jolla, CA (USA)
Laboratory and field acceptance performance of CONAC, 9:9264 (R;US)
Science Applications, Inc., McLean, VA (USA)
Active Program Research Requirements (APRR). Volume II. Appendix A. Cost Catalog. Final report, 9:9703 (R;US)
Science Research Council, Chilton (UK). Rutherford and Appleton Labs.
First measurement of efficiency and precision of CCD detectors for high energy physics, 9:10614 (R;GB)
Physics of particle acceleration, 9:10483 (R;GB)
Scientific Design Co., Inc., New York (USA)
Great Plains ASPEN model development. Technical progress report, November 1-30, 1983, 9:9225 (R;US)

Great Plains ASPEN model development. Technical progress report, October 1, 1983-October 31, 1983, 9:9226 (R;US)
Scientific Systems, Inc., Cambridge, MA (USA)
Qualitative methods in power system stability, 9:9757 (R;US)
S-Cubed, La Jolla, CA (USA)
Transient gas flow along single or bundled electrical cables surrounded by a permeable medium, 9:10430 (R;US)
Secord (Nelson W.), Brighton, MI (USA)
WECS: load controlled pitch - variable load conversion to heat. Progress report No. 2, 9:9749 (R;US)
WECS - load controlled pitch - variable load conversion to heat. Final report, 9:9750 (R;US)
Self-Reliance, Inc., Washington, DC (USA)
R,D and D needs of DHC technology: summary of R,D and D task recommendations, 9:10168 (R;US)
Research, development and demonstration needs of district heating technology. Final report, 9:10169 (R;US)
Signal UOP, Inc., Des Plaines, IL (USA). Research Center
Advanced NMR characterization of zeolite catalysts. First quarterly report, 1 September-30 November 1983, 9:10347 (R;US)
Skidaway Inst. of Oceanography, Savannah, GA (USA)
Biological processes in the water column of the South Atlantic Bight. Progress report, June 1982-June 1984, 9:10726 (R;US)
Trace element geochemistry of the South Atlantic Bight. Progress report, 9:10737 (R;US)
Solar Energy Research Inst., Golden, CO (USA)
1981 Solar Energy Technical Training Directory. Third edition, 9:9590 (R;US)
Advanced photovoltaic module costing manual, 9:9589 (R;US)
Analysis of a process for converting biomass to diesel fuel, 9:9539 (R;US)
Experimental approach to evaluating environmental degradation mechanisms in bisphenol-A polycarbonate films on metallic substrates, 9:9724 (R;US)
Guidebook to renewable energy technologies. Community renewable energy guidebook series, 9:9583 (R;US)
Microcomputer methods for solar design and analysis: passive and active systems, 9:9582 (R;US)
Photovoltaic R & D program at SERI. An overview report, 9:9609 (R;US)
R and D decision methods for photovoltaic program planning, 9:9611 (R;US)
Solar radiation energy resource Atlas of the United States, 9:9585 (R;US)
Solar Thermal Technology Program: polymer synthesis and characterization subtask. Annual progress report, FY 1983, 9:9723 (R;US)
Specification/cost data base: residential retrofit, 9:9705 (R;US)
Television interference measurements near the MOD-2 WT array at Goodnoe Hills, Washington, 9:9744 (R;US)
Thin-film photovoltaic research and development program of the Solar Energy Research Institute, 9:9610 (R;US)
Your home energy audit: the first step to more energy-efficient living, 9:10063 (R;US)
South Carolina Univ., Columbia (USA)
Status of the Battelle-Carolina ^{76}Ge double beta decay experiment, 9:10613 (R;US)
South Dakota School of Mines and Technology, Rapid City (USA). Dept. of Metallurgical Engineering
Direct utilization of geothermal energy in western South Dakota agribusiness. Final report, 9:9742 (R;US)
Southwest Research Inst., San Antonio, TX (USA)
Corrosion of metals in coal liquefaction processes. Final report, 9:9223 (R;US)
Identification of optimized techniques for operating motor vehicles. Final report, September 1980-September 1981, 9:10128 (R;US)
Identification of optimized techniques for operating motor vehicles. Executive summary, 9:10129 (R;US)
Study and modeling of high temperature fatigue crack propagation in austenitic stainless steel. Final report, September 1, 1979-November 30, 1983, 9:10223 (R;US)
Springborn Labs., Inc., Enfield, CT (USA)
Investigation of test methods, material properties, and processes for solar cell encapsulants. Twenty-fifth quarterly progress report, 9:9596 (R;US)
SRI International, Menlo Park, CA (USA)
Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Technical progress report, 9:11285 (R;US)
Collisional mechanisms in D^- beam sources for MFE experiments and reactors. Progress report No. 16 for quarter ending December 31, 1983, 9:11286 (R;US)
Novel catalytic methods for heteroatom removal in coal liquids upgrading. Quarterly report No. 1, September 1-December 1, 1983, 9:9233 (R;US)
Staatliches Amt fuer Atomsicherheit und Strahlenschutz, Berlin (German Democratic Republic)
Dosimetry of incorporated transuranic radionuclides, 9:10890 (R;DD;In German)
Techniques for radiation protection monitoring of personnel at fusion reactors, 9:11329 (R;DD)
Stanford Linear Accelerator Center, CA (USA)
Charm and beauty lifetime measurements with the MARK II vertex detector, 9:11060 (R;US)
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SLAC SPEAR beam line modules 1 through 18 (Engineering Materials), 9:10561 (E;US)
Stanford Univ., CA (USA). High-Energy Physics Lab.
Plastic box: a 4π detector for intermediate energy heavy ion physics, 9:10609 (R;US)
Statens Inst. for Straalehygiene, Oslo (Norway)
Administrative norms on radiofrequency radiation for occupationally exposed persons, 9:10947 (R;NO;In Norwegian)
^{137}Cs in Norwegian Lapps spring 1981, 9:10714 (R;NO;In Norwegian)
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Statens Kaernkraftinspektion, Stockholm (Sweden)
Study of methods for testing the tubes of steam generators by means of Eddy Current, 9:9786 (R;SE;In Swedish)
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Updating of actual technique for ultrasonic testing of austenitic stainless materials and welds, 9:10440 (R;SE;In Swedish)
Statens Naturvaardsverk, Solna (Sweden)
Acidifying and basic effects of nitrogen fertilizers on forest soil, 9:9615 (R;SE;In Swedish)
Effects of lake acidification on bird populations, 9:10743 (R;SE;In Swedish)
Hydrogeological conditions for leachate reduction at landfill sites, 9:10708 (R;SE;In Swedish)
Statens Raad foer Byggnadsforskning, Stockholm (Sweden)
Extracting heat from and storing heat in ground and water. Method of inventory and statement of natural conditions, 9:9948 (R;SE;In Swedish)
Extracting heat from and storing heat in ground and water. Legal aspects, 9:9949 (R;SE;In Swedish)
Influence of the dwelling habits on the consumption of energy in small houses, 9:10060 (R;SE;In Swedish)
Solar heated public outdoor swimming pools, 9:9694 (R;SE;In Swedish)
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Release of activity and ocupational exposures of the nuclear power industry. Third quarter 1982, 9:9861 (R;SE;In Swedish)
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Statens Vattenfallsverk, Vaellingby (Sweden)
Program for parameter studies of steam generators, 9:9840 (R;SE;In Swedish)
Statens Vattenfallsverk, Vaellingby (Sweden). Projekt KOL-HAELSA-MILJOE
Basic pollutant emissions and their statistics of two coal fired boilers, 9:9765 (R;SE)

Bearing value and settlement of fly ash depositions from pressure metering and cone penetration tests, 9:9267 (R;SE;In Swedish)
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Environmental risks of oil and coal transport at sea. A comparative study., 9:9284 (R;SE;In Swedish)
Health effects due to the emission of mercury on the combustion of coal, 9:9319 (R;SE;In Swedish)
Kidney injuries and cadmium. Riskestimation concerning kidney injuries due to cadmium exposure, 9:10925 (R;SE;In Swedish)
Long-term study of a 240 MW coal powder fueled heat electric station, 9:9282 (R;SE;In Swedish)
Measurements of suspended particles and particle deposition. Methods and evaluation of methods, 9:10656 (R;SE;In Swedish)
Mutagenicity in emissions from coal and oil fired boilers as detected by the salmonella/microsome assay, 9:10657 (R;SE)
Mutagenicity tests of flue gas emissions from coal and oil fired plants. Investigation of the cells of Drosophila and mammals, 9:9317 (R;SE;In Swedish)
Operation disturbances affecting the emission. Frequency-Duration-Level, 9:9285 (R;SE;In Swedish)
Variations in particulate effluent mutagenicity from a coal fired boiler, 9:9318 (R;SE;In Swedish)

State Univ. of New York, Buffalo (USA)
Plasma magnetic field measurement by intracavity absorption. Progress report, June 1, 1983-May 31, 1984, 9:11186 (R;US)

State Univ. of New York, Buffalo (USA). Dept. of Chemical Engineering
Catalytic coal liquefaction. Quarterly report, October-December 1983, 9:9227 (R;US)

State Univ. of New York, Stony Brook (USA)
Type II successful supernovae, the anatomy of shocks: neutrino emission and the adiabatic index, 9:10974 (R;US)
X-ray holographic microscopy experiments at the Brookhaven synchrotron light source, 9:10628 (R;US)

State Univ. of New York, Stony Brook (USA). Dept. of Physics
Generation of intense coherent soft x-ray with electron microbunches induced and frozen by lasers, 9:9528 (R;US)

State Univ. of New York, Stony Brook (USA). Health Science Center
Status of pulmonary host defense in the neonatal sheep: cellular and humoral aspects, 9:10829 (R;US)

Stazione Zoologica, Naples (Italy)
Quantitative analysis and simulation of Mediterranean coastal ecosystems: the Gulf of Naples, a case study, 9:10725 (R;US)

Steirische Wasserkraft- und Elektrizitaets-A.G. (STEWEAG), Graz (Austria)
STEWEAG business report 1981, 9:9580 (R;AT;In German)

Sterling Systems, Inc., McLean, VA (USA)
Collection, reduction, operation, maintenance and documentation of energy data for the petroleum industry. Final report, 9:9337 (R;US)

Stevens Inst. of Tech., Hoboken, NJ (USA). Dept. of Mechanical Engineering
New theory for the conversion of solar-derived wind energy using oscillating cascades of airfoils. Final technical report, 9:9753 (R;US)

Stichting Energieonderzoek Centrum Nederland, Petten
Final report on the REAL-80 exercise, 9:10576 (R;NL)

Studsvik Energiteknik AB, Nykoeping (Sweden)
Experimental study of defect power reactor fuel. Final report, 9:9777 (R;SE)

Studsvik Science Research Lab., Nykoeping (Sweden)
Progress report 1982, 9:9867 (R;SE)

Stuttgart Univ. (Germany, F.R.)
Comparison of the picture of the intensity of radiation of a flame obtained by a television camera with intensity picture obtained from temperature and concentration measurements, 9:10393 (R;DE;In German)

Svensk Kaernbraenslefoersoerjning AB, Stockholm
Alfven wave excitation in a cavity with a transverse magnetic field, 9:11245 (R;SE)
Diffusion in crystalline rocks of some sorbing and nonsorbing species, 9:9489 (R;SE)
Diffusion of hydrogen, hydrogen sulfide and large molecular weight anions in bentonite, 9:10298 (R;SE)
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Finite larmor radius stabilization of Z-pinches, 9:11244 (R;SE)
Movement of a redox front downstream from a repository for nuclear waste, 9:10716 (R;SE)
Possible effects of alpha and beta radiolysis on the matrix dissolution of spent nuclear fuel, 9:9491 (R;SE)
Radioactive disequilibria in mineralised drill core samples from the Bjoerklund uranium occurence, northern Sweden, 9:9490 (R;SE)
Radionuclide transport in a single fissure. A laboratory study, 9:10717 (R;SE)
Zero-dimensional EXTRAP computer code, 9:11242 (R;SE)

Sveriges Lantbruksuniversitet, Garpenberg. Institutionen foer Skogsteknik
Fuelwood as a source of energy in private forestry - the situation in 1979 and future potential, 9:9614 (R;SE;In Swedish)
Study on cost of machine use in forestry. Proposing fuel consumption as cost determinant, 9:9613 (R;SE;In Egnlish)

Sveriges Lantbruksuniversitet, Lund. Inst. foer Lantbrukets Byggnadsteknik
Internal solar collectors for greenhouses, 9:9706 (R;SE;In Swedish, English)

Swedish Univ. of Agricultural Sciences, Uppsala. Dept. of Radioecology
Aspects on the use of isotopes in studies of biological dinitrogen fixation by legumes, 9:10792 (R;SE)
Root bioactivity of corn and sunflower as evaluated by ^{75}Se-plant injection technique, 9:10791 (R;SE)

Swedish Water and Air Pollution Research Lab., Goeteborg
Extra high emissions of nitrogen oxides in Gothenburg 1975-1981, 9:10655 (R;SE;In Swedish)

Synergic Resources Corp., Bala-Cynwyd, PA (USA)
Coal production forecasts in the 1978 ARC: an analysis of problem areas. Final report, 9:9321 (R;US)
Use of the National Coal Model (NCM) in production goal analysis. Final report, 9:9320 (R;US)

T

Technische Hochschule Aachen (Germany, F.R.)
Applications of petroleum coke, 9:9331 (R;DE;In German)

Technische Hochschule Aachen (Germany, F.R.). Fakultaet fuer Bergbau und Huettenwesen
Possibilities to transport shield-type support with a trackless device during installing of props in the German bituminous coal mining, 9:9292 (R;DE;In German)

Technische Hogeschool Eindhoven (Netherlands)
Avalanches in insulating gases, 9:11005 (R;NL)
Discharges in the inlet region of a noble gas MHD generator, 9:11045 (R;NL)
Linear and nonlinear instability theory of a noble gas MHD generator, 9:10047 (R;NL)

Technische Hogeschool Twente, Enschede (Netherlands)
Nuclear energy - what do you know about it, 9:10008 (R;NL)

Technische Univ. Berlin (Germany, F.R.). Fachbereich Verfahrenstechnik
Determining the mass flow of gases using a capacitive differential pressure transducer with vibrating membrane, 9:10632 (R;DE;In German)

Technische Univ. Clausthal, Clausthal-Zellerfeld (Germany, F.R.). Fakultaet fuer Bergbau, Huettenwesen und Maschinenwesen
Calculation of earth movements above cavern-like openings under consideration of the global volume convergence, 9:10469 (R;DE;In German)
Fundamental investigations to analyse the strength parameters in the mining method with freezing stowing, 9:10470 (R;DE;In German)

Mathematical model of the heating of coke ovens, 9:9236 (R;DE;In German)
Model formulations for the mathematical-statistical evaluation of operation data as a planning assistance in the assessment of face operations in the bituminous coal mining, 9:9293 (R;DE;In German)
Process for the analytical investigation of acyclic operational events in the bituminous coal mining presented by the example of a large-scale investigation of the development and withdrawal of shield faces, 9:9291 (R;DE;In German)
Rock burst prevention in the Ruhr mining with special regard to the destressing blasting, 9:10471 (R;DE;In German)

Technische Univ. Muenchen, Garching (Germany, F.R.). Inst. fuer Physikalische Chemie 1
Resonance Raman spectra of photochemical picosecond transients: method and application to study bacteriorhodopsin primary processes, 9:10765 (R;US)

Tekniska Hoegskolan, Lund (Sweden). Fysiska Institutionen
Applications of laser techniques for combustion studies, 9:10392 (R;SE)
Radon measurements indoors. An evaluation of performed measurements, 9:10690 (R;SE;In Swedish)
UV lidar techniques for atmospheric NO monitoring, 9:10658 (R;SE)

Tekniska Hoegskolan, Lund (Sweden). Institutionen foer Vaerme- och Krafteknik
Future for fuelwood on the Swedish wood market, 9:10045 (R;SE;In Swedish)

Tennessee Univ., Knoxville (USA). Dept. of Physics
Sensitive collinear laser spectroscopy on fast atom and ion beams, 9:10574 (R;US)

Tennessee Univ., Oak Ridge (USA). Graduate School of Biomedical Sciences
Mutagenic properties of O^6-methylguanine in DNA in vivo and in vitro, 9:10764 (R;US)
Quantitative and molecular analyses of mutation in a pSV2gpt transformed CHO cell line, 9:10843 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Conservation and Rates
Build-it-yourself solar water heater: reduce electric use, 9:9708 (R;US)

Tennessee Valley Authority, Chattanooga (USA). Div. of Energy Demonstrations and Technology
Batch sulfurmeter installation and testing at the Paradise Coal Preparation Plant, 9:9299 (R;US)
Evaluation of sodium thiosulfate additive on the performance of a spray tower (train 100) scrubber system using limestone slurry, May 5, 1982-August 17, 1982. Final report, 9:9269 (R;US)
Laboratory and field acceptance performance of CONAC, 9:9264 (R;US)
TVA's 500-kV electric and magnetic fields measurements and analyses. Final report, 9:9770 (R;US)

Tennessee Valley Authority, Knoxville (USA). Office of Natural Resources
Operation of TVA reservoirs: annual 1980, 9:9560 (R;US)

Tennessee Valley Authority, Knoxville (USA). Office of Natural Resources and Economic Development
Assessment of potential impact of the Clinch River Breeder Reactor Plant thermal effluent on the Watts Bar Reservoir striped bass population, 9:10755 (R;US)

Tennessee Valley Authority, Muscle Shoals, AL (USA). Office of Natural Resources
Thermal effects on bluegill hematology. Final report, 9:10914 (R;US)

Teshmont Consultants, Inc., Winnipeg, Manitoba (Canada)
Southeast Alaska intertie dc transmission system: reconnaissance design and cost estimate. Appendix I, 9:9766 (R;US)
Southeast Alaska intertie dc transmission system: reconnaissance design and cost estimate, 9:9767 (R;US)

Texas Governor's Energy Advisory Council, Austin (USA)
Fuels-future availability, 9:9990 (R;US)
Testimony before the Senate Human Resources Committee concerning individual metering of apartment houses, 9:10071 (R;US)

Texas Tech Univ., Lubbock (USA)
Crosbyton Solar Power Project, Phase I. Volume I. Main text, 9:9684 (R;US)
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Crosbyton Solar Power Project, Phase I. Volume III. Appendices I-M, 9:9686 (R;US)
Crosbyton Solar Power Project, Phase I. Volume IV. Main text, 9:9687 (R;US)
Crosbyton Solar Power Project, Phase I. Volume V. Appendices A-L, 9:9688 (R;US)

Texas Univ., Austin (USA). Center for Energy Studies
Monte Carlo prediction of the thermal performance of the tubular solar collector with reflector, 9:9726 (R;US)
Precision of solar collector testing and selection of instruments of measurement, 9:9725 (R;US)

Texas Univ., Austin (USA). Inst. for Fusion Studies
MHD activity in the ISX-B tokamak: experimental results and theoretical interpretation, 9:11187 (R;US)

Tills (Jack) and Associates, Inc., Albuquerque, NM (USA)
CONTAIN calculations of severe accident sequences at the Surry Nuclear Power Plant, 9:9914 (R;US)

Tishman Research Corp., New York (USA)
Occupancy analysis: design and operational energy studies in a new high-rise office building. Volume 3, 9:10062 (R;US)

Toulouse-3 Univ., 31 (France)
Contribution to the study of gamma radiolysis of 2-furyl butyl or substituted phenyl ketones in isopropanol, 9:10384 (R;FR;In French)

Transnuclear, Inc., White Plains, NY (USA)
Extended Fuel Burnup Demonstration Program. Transport considerations for transnuclear casks, 9:10402 (R;US)

U

UKAEA Atomic Energy Establishment, Winfrith
Oscillator measurements of the reactivity changes resulting from the irradiation of low enrichment particulate fuel in the Dragon reactor, 9:9863 (R;GB)
Standards for maintenance documentation of COSMOS programs, 9:9811 (R;GB)
TRACMAB. A computer code to form part of the link between the codes TRAC and MABEL, 9:9872 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Instrumentation and Applied Physics Div.
Isotope tracer measurement system incorporating the HP85 computer, 9:10568 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Materials Development Div.
Cementitious materials for the encapsulation of radioactive wastes. Paper 1: cement production and cement hydration, 9:10288 (R;GB)
Radiation stability of plastics and rubbers, 9:10286 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Metallurgy Div.
Variation in cooling rate in a 35 mm thick steel block using different cooling media, 9:10205 (R;GB)

UKAEA Atomic Energy Research Establishment, Harwell. Nuclear Physics Div.
Potential for the application of nuclear techniques in selected developing countries in Africa, 9:10960 (R;GB)

UKAEA Weapons Group, Aldermaston. Atomic Weapons Research Establishment
Results of integral experiments on VERA assemblies, 9:9862 (R;US)

UKIRT, Hilo, HI (USA)
Observations of the interstellar ice grain feature in the Taurus molecular clouds, 9:10978 (R;US)

Union Carbide Corp., Oak Ridge, TN (USA). Nuclear Div.
Design of the coolant system for the Large Coil Test Facility pulse coils, 9:11274 (R;US)

Union Rheinische Braunkohlen Kraftstoff A.G., Wesseling/Koeln (Germany, F.R.)
Methanol fuel M 100 - development and technology, 9:9557 (R;DE;In German)

United Nations Educational, Scientific and Cultural Organization, 75 - Paris (France)
Quantitative analysis and simulation of Mediterranean coastal ecosystems: the Gulf of Naples, a case study, 9:10725 (R;US)

University of Southwestern Louisiana, Lafayette (USA). Dept. of Geology
Louisiana peat resources. Final technical report, 1 April 1981-15 April 1983, 9:9289 (R;US)
Uppsala Univ. (Sweden). Inst. of Tech.
MHD-equilibrium and stability of a z-pinch in an external magnetic field, 9:11249 (R;SE)
USDOE Assistant Secretary for Conservation and Renewable Energy, Washington, DC
Residential Conservation Service installer's guide, 9:10082 (R;US)
USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety
DOE explosives safety manual. Revision 1 , 9:10636 (R;US)
Fourth DOE environmental protection information meeting. Proceedings, 9:10680 (R;US)
USDOE Assistant Secretary for Management and Administration, Washington, DC. Office of Civilian Radioactive Waste Management
Initial implementation plan for deployment of federal interim storage facilities for commercial spent nuclear fuel, 9:9451 (R;US)
USDOE Bartlesville Energy Technology Center, OK
Liquid fossil fuel technology. Quarterly technical progress rport, April-June 1983, 9:9324 (R;US)
USDOE Bonneville Power Administration, Portland, OR
Issue backgrounder: surplus power, 9:10035 (R;US)
Proposed Memorandum of Understanding between Bonneville Power Administration and Western Area Power Administration. Environmental assessment, 9:10037 (R;US)
Wholesale power rate schedules and general rate schedule provisions, 9:10036 (R;US)
USDOE Economic Regulatory Administration, Washington, DC. Office of Fuels Programs
Conversion to coal: Baltimore Gas and Electric Company, Brandon Shores Generating Station Units 1 and 2, Anne Arundel County, Maryland. Draft environmental impact statement, 9:9762 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Coal, Nuclear, Electric and Alternate Fuels
Coal distribution, January-September 1983, 9:9314 (R;US)
Electric power monthly, 9:10039 (R;US)
Quarterly coal report, July-September 1983, 9:9313 (R;US)
Typical electric bills, January 1, 1983, 9:10038 (R;US)
USDOE Energy Information Administration, Washington, DC. Office of Oil and Gas
Natural gas monthly, 9:9369 (R;US)
Recent market activities of major interstate pipeline companies, 9:9355 (R;US)
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USDOE Morgantown Energy Technology Center, WV
Sensitivity analysis and model optimization for reaction-diffusion systems, 9:10346 (R;US)
USDOE Nevada Operations Office, Las Vegas
Engineering Test Plan for field radionuclide migration experiments in Climax granite: peer review documentation, 9:9515 (R;US)
Nevada Nuclear Waste Storage Investigations. Quarterly report, April-June 1983, 9:9486 (R;US)
USDOE Office of Energy Research, Washington, DC
Great Plains Gasification Associates Facility, North Dakota: recommendations for a supplemental environmental program. Final report of the Ecological and Environmental Effects Subcommittee, 9:9988 (R;US)
USDOE Office of Energy Research, Washington, DC. Development and Technology Div.
Special-purpose materials for magnetically confined fusion reactors. Fifth annual progress report, 9:11283 (R;US)
USDOE Office of Energy Research, Washington, DC. Office of Health and Environmental Research
Research in progress: FY 1984. Summaries of projects sponsored by the Office of Health and Environmental Research, 9:10920 (R;US)
Status report: solid waste management, 9:9316 (R;US)
USDOE Office of Inspector General, Washington, DC
Office of Inspector General FY 1983 semiannual report, April 1, 1983-September 30, 1983, 9:9967 (R;US)
Utah State Univ., Logan (USA). Inst. of Social Science Research on Natural Resources
Water transfers from agriculture to industry, 9:9997 (R;US)
Utah Univ., Salt Lake City (USA)
Theoretical and experimental study of solid phase miscibility gaps in III/V quaternary alloys. Progress report, 9:10292 (R;US)
Utah Univ., Salt Lake City (USA). Research Inst.
Hydrothermal Injection Research Program. Annual progress report, FY 1983, 9:9738 (R;US)

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Vanderbilt Univ., Nashville, TN (USA). Dept. of Physics
Sensitive collinear laser spectroscopy on fast atom and ion beams, 9:10574 (R;US)
Varian Associates, Inc., Palo Alto, CA (USA)
Infrared monitoring of gyrotron windows, 9:11279 (R;US)
Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)
Heat transfer in oscillatory flow. Progress report, January 1983-December 1983, 9:10425 (R;US)
Virginia Univ., Charlottesville (USA). Dept. of Chemistry
Glow discharge as an atomization and ionization device. Progress report, November 1, 1982-November 1, 1983, 9:10312 (R;US)
Virginia Univ., Charlottesville (USA). Dept. of Physics
Spectroscopy of surface adsorbed molecules. Progress report, May 1, 1983-April 30, 1984, 9:10990 (R;US)
Vitro Labs., Silver Spring, MD (USA)
Solar energy system performance evaluation update. Karasek Home, Blackstone, Massachusetts, April 1982-May 1983, 9:9707 (R;US)
Vrije Univ., Amsterdam (Netherlands)
High resolution studies of barium Rydberg states, 9:11004 (R;NL)
Running for life. Studies on the locomotory activity and population dynamics of Pterostichus versicolor Sturm and Calathus melanocephalus L. (Coleoptera, Carabidea), 9:10830 (R;NL)

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Title, (supplementary information), citation number, (R:US)

The notations in the final parentheses indicate the type of document, e.g., R for Report; the country of publication, e.g., US; and the language if other than English, e.g., In German. Tables of document types and country of publication codes appear after the indexes.

The title may be supplemented with additional words, or a phrase, if it appears additional information would be helpful. In cases for which the title contains little or no information related to the subject entry, it may be replaced entirely by the supplementary information. A qualifier is not always required, and in such cases the title will follow the unqualified subject descriptor.

The descriptors selected for use as subject terms are generally the names of specific materials, things, or processes. To the extent possible, a qualifier is selected to describe the properties of, or processses applied to, the subject term.

Index entries are selected to indicate the important ideas and concepts presented in a document, rather than words that may appear in the text. Within the available thesaurus terms, the most probable or logical place to look for typical information is selected. "See references" are included to guide users from synonymous terms or phrases to the descriptor selected as a subject heading for the concept. (e.g. Pipeline Quality Gas see HIGH BTU GAS). "See also references" are used to indicate where to find references to subject concepts that are narrower, broader, or related to a particular subject heading. To complete an exhaustive search of a given subject, all such headings should be reviewed. Copies of DOE/TIC-7000, the Subject Thesaurus, are available from the National Technical Information Service (NTIS), U. S. Department of Commerce, Springfield, VA 22161.

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Building technology publications. supplement 7: 1982. Final report, 9: 10075 (R;US)
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Occupancy analysis: design and operational energy studies in a new high-rise office building. Volume 3, 9: 10062 (R;US)
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Noise attenuating properties of earmuffs worn by miners. Volume 1. Comparison of earmuff attenuation as measured by psychophysical and physical methods. Open file report (final) Jan-Oct 1979, 9: 10702 (R;US)
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Requirement of nuclear data and inaccuracy of nuclear data in evaluating the target values of shielding calculations for the light water reactor and the high-temperature reactor, 9: 9779 (B;DE;In German)

REACTOR SAFETY
Evaluation
Systematic evaluation program. Status summary report. Volume 5, No. 10, 9: 9896 (R;US)
Information Systems
Guide on a national system for collecting, assessing and disseminating information on safety-related events in nuclear power plants. A pre-publication working document, 9: 9888 (R;XA)
Meetings
Third Japan-US seminar on HTGR safety technology: proceedings. Volume II, 9: 9904 (R;US)
Public Opinion
Safety: Science and technique in social problems, 9: 10007 (RA;NL;In Dutch)
Research Programs
Light Water Reactor Safety Research Program. Semiannual report, April-September 1982, 9: 9909 (R;US)

REACTOR SAFETY EXPERIMENTS
Research Programs
PFR/TREAT programme: objectives, progress and future work, 9: 9926 (BA;FR)

REACTOR SHUTDOWN
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Efficient simulation approach for evaluating the potential effects of nuclear power plant shutdowns on electrical utility generating systems, 9: 9971 (R;US)

REACTOR SITES
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Determination of seismic reference motions on nuclear sites in France, 9: 9876 (R;FR;In French)

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System for monitoring the IBR-2 pulsed reactor power for the experiments during the reactor operating start-up, 9: 9866 (R;SU;In Russian)

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Renewable energy resource planning in Orange County: a summary of procedures used for renewable assessment. Piedmont Cresent Energy Project, 9: 10044 (R;US)
Demonstration Programs
Midwest Appropriate Technology Small Grants Program project summaries, 9: 9977 (R;US)

REDOX REACTIONS
Charge Transport
Photochemical energy storage: studies of inorganic photoassistance agents. Progress report, November 30, 1982-November 29, 1983, 9: 9593 (R;US)

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Comparison of domestic olivine and European magnesite for electrically charged thermal energy storage, 9: 9952 (J;US)

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Assessment of gas-fired commercial refrigeration. Final report Mar-Aug 1982, 9: 10079 (R;US)
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SOLAR ENERGY
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Agricultural Wastes
Recent developments and experience in the use of alternative energy sources, 9: 10043 (RA;DE;In German)
Manuals
Guidebook to renewable energy technologies. Community renewable energy guidebook series, 9: 9583 (R;US)

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Alloy Nuclear Fuels
U-Si and U-Si-Al dispersion, fuel alloy development for research and test reactors, 9: 9444 (J;US)
Fuel Element Failure
Study of the U_3O_8-Al thermite reaction and strength of reactor fuel tubes, 9: 9864 (R;US)
Reactor Control Systems
DUAL-PROCESS, a highly reliable process control system, 9: 9855 (R;HU)

RESEARCH PROGRAMS
To be used jointly with descriptor(s) for subject field and/or organization concerned.
Bibliographies
Coal research projects - North and South America, 9: 9219 (R;US)
Comparative Evaluations
Support service to the Office of Oil, Gas, Shale and Coal Liquids. Final report, 9: 9218 (R;US)
Planning
Support service to the Office of Oil, Gas, Shale and Coal Liquids. Final report, 9: 9218 (R;US)
Reviews
Support service to the Office of Oil, Gas, Shale and Coal Liquids. Final report, 9: 9218 (R;US)

RESERVOIR ENGINEERING
Earth Sciences Division annual report, 1982, 9: 9729 (R;US)

RESERVOIR ROCK
Fracture Mechanics
A comprehensive fracture diagnostics instrumentation fielding program, 9: 9379 (J;US)
Simulation
Infill drilling for shale gas development: A field case study, 9: 9416 (J;US)

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Air Infiltration
Acoustical benefits resulting from insulation and air leakage control in family housing units. Final report Jul 1981-Sep 1982, 9: 10056 (R;US)
Air infiltration measurements in a home using a convenient perfluorocarbon tracer technique, 9: 10675 (J;GB)
The effects of ventilation on residential air pollution due to emissions from a gas-fired range, 9: 10677 (J;GB)
Energy Accounting
Residential photovoltaic systems: results and issues, 9: 9669 (J;US)
Energy Audits
Resource materials developed in support of the residential conservation service rule issued on November 7, 1979, 9: 10064 (R;US)
Energy Conservation
Building energy use compilation and analysis (BECA). Part B: retrofit of existing North American residential buildings, 9: 10089 (J;CH)
Energy efficiency and conservation in buildings: the use of indicators, 9: 10023 (J;GB)
Policy implications of a successful energy conservation program in university buildings and dormitories, 9: 10022 (J;CH)
Residential Conservation Service installer's guide, 9: 10082 (R;US)
Resource materials developed in support of the residential conservation service rule issued on November 7, 1979, 9: 10064 (R;US)

Energy Consumption
BEPS equivalency study. Final report, 9: 10018 (R;US)
Measures of nonlinearity for segmented regression models. Technical summary report, 9: 10057 (R;US)
Energy Efficiency
BEPS equivalency study. Final report, 9: 10018 (R;US)
Energy efficiency and conservation in buildings: the use of indicators, 9: 10023 (J;GB)
Energy Models
Development of equipment seasonal performance models for simplified energy analysis methods, 9: 10123 (J;US)
Gas Heat Pumps
Development of a residential gas absorption heat pump, 9: 10084 (J;US)
Indoor Air Pollution
Estimated health effects from a regionwide weatherization program, 9: 10934 (R;US)
Noise Pollution Control
Acoustical benefits resulting from insulation and air leakage control in family housing units. Final report Jul 1981-Sep 1982, 9: 10056 (R;US)
On-Site Power Generation
Residential photovoltaic systems: results and issues, 9: 9669 (J;US)
Photovoltaic Power Supplies
Design and construction of a hybrid photovoltaic (3KW /SUB p/) -thermal solar energy system for a residential/commercial building, 9: 9667 (J;US)
Residential photovoltaic systems: results and issues, 9: 9669 (J;US)
Residential photovoltaic system simulation: electrical aspects, 9: 9672 (J;US)
Power Systems
Design and construction of a hybrid photovoltaic (3KW /SUB p/) -thermal solar energy system for a residential/commercial building, 9: 9667 (J;US)
Retrofitting
Building energy use compilation and analysis (BECA). Part B: retrofit of existing North American residential buildings, 9: 10089 (J;CH)
Shielding
Shielding factors for typical houses in the Nordic countries, 9: 11398 (R;NO)
Solar Air Conditioning
Performance criteria for solar heating and cooling systems in residential buildings, 9: 9704 (R;US)
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Design and construction of a hybrid photovoltaic (3KW /SUB p/) -thermal solar energy system for a residential/commercial building, 9: 9667 (J;US)
Solar Space Heating
Performance criteria for solar heating and cooling systems in residential buildings, 9: 9704 (R;US)
Space HVAC Systems
Development of equipment seasonal performance models for simplified energy analysis methods, 9: 10123 (J;US)
Stirling Engines
Free-Piston Stirling Engine: an advanced prime mover for advanced residential gas-fired equipment, 9: 10096 (BA;US)
Thermal Insulation
Acoustical benefits resulting from insulation and air leakage control in family housing units. Final report Jul 1981-Sep 1982, 9: 10056 (R;US)
Ventilation
The effects of ventilation on residential air pollution due to emissions from a gas-fired range, 9: 10677 (J;GB)
Weatherization
Estimated health effects from a regionwide weatherization program, 9: 10934 (R;US)

RESIDENTIAL SECTOR
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Reaching people with energy conservation information: four statewide residential case studies, 9: 10177 (R;US)
Photovoltaic Power Plants
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Prototype residential Photovoltaic systems: Evaluation results, 9: 9678 (J;US)
Residential photovoltaic power conditioning technology for grid connected applications, 9: 9681 (J;US)
Space Heating
Survey of alternative fuels for residential and commercial space heating. Final report, 9: 10061 (R;US)

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SMOKES
Sorptive Properties
Thermodynamic behavior of coal liquids in the presence of coal solids characterization of IOM and ash. First quarterly progress report, August 1-November 1, 1983, 9: 9234 (R;US)

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RESINS
Structural Chemical Analysis
Spectroscopic characterization of the cured state of acetylene-terminated resin. Final report 1 Apr 1982-31 Mar 1983, 9: 10285 (R;US)

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Fuels-future availability, 9: 9990 (R;US)

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Influence of PCB and hazardous waste regulations on the operations of the Western Area Power Administration, 9: 9984 (RA;US)

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Model industry initiated energy conservation program. Final report, 9: 10174 (R;US)

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A tissue distribution model for assessment of human inhalation exposures to $^{241}AmO_2$, 9: 10904 (J;GB)

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Plasma levels of immunoreactive erythropoietin after acute blood loss in man, 9: 10835 (J;GB)

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Building energy use compilation and analysis (BECA). Part B: retrofit of existing North American residential buildings, 9: 10089 (J;CH)
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Characterization and isolation of a light driven sodium pump from membranes of Halobacterium halobium. Final technical progress report, 9: 10767 (R;US)
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Characterization and isolation of a light driven sodium pump from membranes of Halobacterium halobium. Final technical progress report, 9: 10767 (R;US)
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Consolidated fuel reprocessing program: a guide for reliability and maintainability data acquisition, 9: 9445 (R;US)
RISOE NATIONAL LABORATORY
Prior to 1978, known as RISOE RESEARCH ESTABLISHMENT and documents written before that date should be so indexed.
Bibliographies
Annual report 1982 chemistry department, 9: 11363 (R;DK)
Research Programs
Reports issued by the Risoe National Laboratory in the series: RISO-R reports and RISO-M reports, 9: 11362 (R;DK)
RIVER DELTAS
Ground Subsidence
Subsidence in coastal Louisiana: causes, rates, and effects on wetlands, 9: 10727 (R;US)
RNA-ASE
Code number 3.1.4.22 and 3.1.4.34.
Biochemical Reaction Kinetics
Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1982-September 14, 1983, 9: 10766 (R;US)
Enzyme Activity
Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1982-September 14, 1983, 9: 10766 (R;US)
Purification
Investigation of the nature of semisynthetic esterases. Annual progress report, September 15, 1982-September 14, 1983, 9: 10766 (R;US)
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Safety evaluation report related to steam generator repair at H.B. Robinson Steam Electric Plant, Unit No. 2. Docket No. 50-261, 9: 9902 (R;US)
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Rock burst prevention in the Ruhr mining with special regard to the destressing blasting, 9: 10471 (R;DE;In German)
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CSM/OCRD hard rock test facility at the CSM experimental mine, Idaho Springs, Colorado (Granitic gneiss), 9: 10964 (R;US)
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Cation promotion effects in zeolite-supported F-T catalysts. First quarterly report, September-November 1983, 9: 9538 (R;US)
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Safeguards and security. Progress report, August 1982-January 1983, 9: 9521 (R;US)
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Western Gas Sands Subprogram. Status report, October-November-December 1982, 9: 9374 (R;US)
Hydraulic Fracturing
Liquid fossil fuel technology. Quarterly technical progress rport, April-June 1983, 9: 9324 (R;US)
Western Gas Sands Subprogram. Status report, October-November-December 1982, 9: 9374 (R;US)
Mineralogy
Mineralogic and petrologic overview of core samples from the Dept. of Energy's western gas sands project multiwell experiment, Piceance Basin, Colorado, 9: 9357 (J;US)
Permeability
A case study of the Wilcox (Lobo) trend in Webb and Zapata counties, Texas, 9: 9375 (J;US)
Retention of polyacrylamide by berea sandstone, baker dolomite, and sodium kaolinite during polymer flooding. Paper SPE 8981, 9: 9323 (R;US)
State of the art hydraulic fracture stimulation treatment for a western tight sand reservoir, 9: 9382 (J;US)
The effect of stress-dependent permeability on gas production and well testing, 9: 9367 (J;US)
Western Gas Sands Subprogram. Status report, October-November-December 1982, 9: 9374 (R;US)
Petrology
Mineralogic and petrologic overview of core samples from the Dept. of Energy's western gas sands project multiwell experiment, Piceance Basin, Colorado, 9: 9357 (J;US)
Porosity
Retention of polyacrylamide by berea sandstone, baker dolomite, and sodium kaolinite during polymer flooding. Paper SPE 8981, 9: 9323 (R;US)
Resource Development
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Thermophysical behavior of St. Peter sandstone: application to compressed air energy storage in an aquifer, 9: 9943 (R;US)
SANITARY LANDFILLS
Feasibility of in situ solidification/stabilization of landfilled hazardous wastes. Final report Nov 81- Mar 82, 9: 10724 (R;US)
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Analysis of landfill gas enhancement data, Controlled Landfill Project, Mountain View, California, 9: 9543 (BA;US)
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US NRC
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Information Dissemination
Title list of documents made publicly available, October 1-31, 1983. Vol. 5, No. 10, 9: 9824 (R;US)

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Public Information
Title list of documents made publicly available, September 1-30, 1983. Volume 5, No. 9, 9: 10011 (R;US)

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	9:10053	Journal of the Electrochemical Society 130 NO. 8. 1789-1791 (Aug 1983).
	9:10088	Energy (Oxford) 8 NO. 6. 433-449 (Jun 1983).
	9:10089	Energy and Buildings 5 NO. 3. 151-170 (Jun 1983).
	9:10114	Energy (Oxford) 7 NO. 11. 909-925 (Nov 1982).
	9:10172	Energy (Oxford) 7 NO. 11. 927-943 (Nov 1982).
	9:10197	LBL—16622
	9:10239	LBL—16550
	9:10240	LBL—16573
	9:10241	LBL—16681
	9:10258	Metallurgical Transactions, [Section] A: Physical Metallurgy and Materials Science 14A 112
	9:10297	LBL—16778
	9:10300	Physical Review Letters 51 NO. 21. 1983-1986 (21 Nov 1983).
	9:10350	LBL—16998
	9:10367	Journal of the American Chemical Society 105 NO. 9. 2550-2553 (4 May 1983).
	9:10375	Journal of Physical Chemistry 87 NO. 13. 2360-2364 (23 Jun 1983).
	9:10376	Journal of Physical Chemistry 87 NO. 13. 2365-2369 (23 Jun 1983).
	9:10380	LBL—16633
	9:10391	LBL—16828
	9:10407	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:10443	LBL—9143
	9:10487	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:10494	LBL—16008
	9:10608	LBL—15958
	Stanford Univ., CA (USA). High-Energy Physics Lab.	
	9:10609	LBL—16799
	Lawrence Berkeley Lab., CA (USA)	
	9:10610	LBL—16926
	9:10677	Environment International 8 447-452 (1982).
	9:10772	LBL—16901
	9:10789	Journal of Theoretical Biology 99 31-68 (1982).
	9:10908	International Journal of Radiation Oncology, Biology and Physics 8 NO. 12. 2109-2120 (Dec
	9:10912	Current Genetics 6 5-11 (1982).
	9:10915	Photochemistry and Photobiology 36 657-661 (1982).
	9:11057	LBL—16736
	9:11063	Physical Review Letters 51 NO. 20. 1826-1829 (14 Nov 1983).
	9:11081	LBL—16819
	9:11087	LBL—16747
	9:11121	Physical Review Letters 51 NO. 21. 1948-1951 (21 Nov 1983).
	9:11131	Physical Review Letters 51 NO. 20. 1854-1857 (14 Nov 1983).
	9:11161	LBL—16551
	9:11322	LBL—16833
	9:11323	LBL—16903
	9:11324	LBL—16939
	9:11384	LBL—16194
	9:11385	LBL—16805
AC03-76SF00472	**Univ. of California, Davis**	
	9:10388	Biochemistry 22 NO. 2. 292-299 (18 Jan 1983).
AC03-76SF00515	**Stanford Linear Accelerator Center, CA (USA)**	
	9:10495	SLAC-CN—232
	9:10523	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:10561	CAPE—2927(13 Dec 1983).
	9:10566	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:11058	SLAC—264
	9:11059	SLAC-PUB—3245
	9:11060	SLAC-PUB—3247
	9:11062	Physical Review Letters 51 NO. 21. 1941-1944 (21 Nov 1983).
	9:11083	Foundations of Physics 13 NO. 11. 1059-1154 (Nov 1983).

Contract No.	Abstract No.	Report No.
AC03-76SF00700	**Rockwell International Corp., Canoga Park, CA (USA). Energy Technology Engineering Center**	
	9:9743	DOE/SF/00700—T5
AC03-76SF01012	**Univ. of California, San Francisco**	
	9:10910	International Journal of Radiation Oncology, Biology and Physics 8 NO. 12. 2121-2125 (Dec
AC03-77CS31590	**Carrier Corp., Syracuse, NY (USA). Energy Systems Div.**	
	9:9700	DOE/CS/31590—T4
AC03-79CS30205	**Brown University, Division of Engineering, Providence, RI**	
	9:9667	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
AC03-79ET14842	**Rockwell International Corp., Canoga Park, CA (USA). Rocketdyne Div.**	
	9:9224	DOE/ET/14842—T24
AC03-80SF10840	**CCB/Cumali Associates, Oakland, CA**	
	9:9974	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
AC03-81ER40050	**Stanford Linear Accelerator Center, CA (USA)**	
	9:11061	SLAC-PUB—3262
AC03-81SF11503	**Radian Corp., Austin, TX (USA)**	
	9:9736	DOE/SF/11503—2
AC03-81SF11573	**JRB Associates, Inc., McLean, VA (USA)**	
	9:9703	DOE/SF/11573—T1-Vol.2
AC04-76DP00053	**Monsanto Research Corp., Miamisburg, OH (USA). Mound**	
	9:9235	MLM-MU—83-71-0003
	9:9527	MLM—3125
	9:10279	International Journal of Hydrogen Energy 8 NO. 10. 801-808 (1983).
	9:10335	MLM—3093(OP)
	9:10354	Scripta Metallurgica 17 NO. 7. 937-942 (Jul 1983).
AC04-76DP00789	**McNeill (Robert L.), Albuquerque, NM (USA)**	
	9:9322	SAND—83-7462
	Sandia National Labs., Albuquerque, NM (USA)	
	9:9328	SAND—83-2096
	9:9367	Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical an
	9:9378	Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical an
	9:9452	NUREG/CR—2325
	9:9522	NUREG/CR—3128
	International Energy Associates Ltd., Washington, DC (USA)	
	9:9523	NUREG/CR—3347-Vol.2
	9:9586	Journal of Solar Energy Engineering 105 NO. 2. 168-173 (May 1983).
	9:9641	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
	Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt e.V., Koeln (Germany, F.R.)	
	9:9682	CONF-8304133—
	International Test and Evaluation Team, Almeria (Spain)	
	9:9683	DOE/DP/00789—T27
	Sandia National Labs., Livermore, CA (USA)	
	9:9689	SAND—82-8048
	9:9690	Scripta Metallurgica 17 NO. 4. 533-536 (Apr 1983).

Contract No.	Abstract No.	Report No.
	Sandia National Labs., Albuquerque, NM (USA)	
	9:9722	SAND—75-0079
	9:9739	SAND—83-0130
	9:9868	SAND—83-1973C
	9:9909	NUREG/CR—3407
	Tills (Jack) and Associates, Inc., Albuquerque, NM (USA)	
	9:9914	SAND—83-1910C
	9:9956	Proceedings, Intersociety Energy Conversion Engineering Conference 4 1574-1581 (Aug 1983).
	9:10259	Journal of Materials for Energy Systems 5 NO. 1. 28-35 (Jun 1983).
	Sandia National Labs., Albuquerque, NM (USA)	
	9:10265	CONF-831174—32
	9:10369	Journal of Physical Chemistry 87 NO. 4. 605-616 (17 Feb 1983).
	9:10371	Journal of the Electrochemical Society 130 NO. 9. 1875-1877 (Sep 1983).
	9:10967	SAND—83-1553
	Rhode Island Univ., Narragansett (USA). Marine Geomechanics Lab.	
	9:10970	SAND—83-7455C
	Sandia National Labs., Albuquerque, NM (USA)	
	9:11388	SAND—83-1376C
	9:11389	SAND—83-1874C
	9:11390	SAND—83-2072C
AC04-76ET20255	**Texas Tech Univ., Lubbock (USA)**	
	9:9684	DOE/ET/20255—T2-Vol.1
	9:9685	DOE/ET/20255—T2-Vol.2
	9:9686	DOE/ET/20255—T2-Vol.3
	9:9687	DOE/ET/20255—T2-Vol.4
	9:9688	DOE/ET/20255—T2-Vol.5
AC04-76EV01013	**Lovelace Biomedical and Environmental Research Inst., Albuquerque, NM**	
	9:10900	Health Physics 44 NO. Sup. 1. 529-535 (1983).
	9:10904	Health Physics 44 NO. Sup. 1. 537-544 (1983).
	9:10905	Health Physics 44 NO. Sup. 1. 545-554 (1983).
	9:10940	Journal of Toxicology and Environmental Health 10 NO. 3. 397-409 (Sep 1982).
	9:10941	Journal of Toxicology and Environmental Health 10 NO. 3. 373-384 (Sep 1982).
AC04-81AL12548	**Heery Energy Consultants, Inc., Atlanta, GA (USA)**	
	9:9697	DOE/AL/12548—T1
AC04-82AL20090	**New Mexico Solar Energy Institute, Las Cruces, NM**	
	9:9679	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
AC05-76OR00033	**Institute for Energy Analysis, Oak Ridge Associated Universities, Oak Ridge, TN**	
	9:9370	Energy (Oxford) 8 NO. 10. 749-756 (Oct 1983).
	9:9973	Energy (Oxford) 8 NO. 6. 419-432 (Jun 1983).
	9:10026	Energy (Oxford) 8 NO. 4. 283-289 (Apr 1983).
	Oak Ridge Associated Universities, Inc., TN (USA)	
	9:10574	CONF-830874—32
AC05-79ET13546	**Metal Properties Council, Inc., New York (USA)**	
	9:9223	DOE/ET/13546—T1
AC05-81OR20722	**Bechtel National, Inc., Oak Ridge, TN (USA)**	
	9:9470	DOE/OR/20722—1

Contract No.	Abstract No.	Report No.
AC06-76FF02170	**Hanford Engineering Development Lab., Richland, WA (USA)**	
	9:9478	HEDL-SA—3016FP
	9:10227	HEDL—7420
	9:10228	HEDL—7421
	9:10229	HEDL—7424
	9:10230	HEDL—7425
	9:10231	HEDL-SA—2905
	9:10232	HEDL-SA—3007-FP
	9:11293	HEDL—7408
	9:11294	HEDL-SA—2925-FP
AC06-76RL01830	**Pacific Northwest Lab., Richland, WA (USA)**	
	9:9238	PNL—4815
	9:9454	American Society of Mechanical Engineers, [Paper] 82-NE-9 8 (1982).
	9:9488	PNL—4938
	9:9494	Nuclear Technology 62 NO. 2. 151-158 (Aug 1983).
	9:9501	Nuclear and Chemical Waste Management 4 NO. 2. 177-188 (1983).
	9:9509	American Society of Mechanical Engineers, [Paper] 82-NE-10 8 (1982).
	9:9519	NUREG/CR—3343
	9:9830	PNL-tr—435(Oct 1983).
	9:9839	PNL-SA—11636
	9:9850	PNL-SA—11681
	9:9912	PNL-SA—11617
	9:9943	PNL—4812
	9:9944	Proceedings, Intersociety Energy Conversion Engineering Conference 4 1714-1720 (Aug 1983).
	9:10151	Proceedings, Intersociety Energy Conversion Engineering Conference 5 2078-2084 (Aug 1983).
	9:10612	PNL-SA—11338
	9:10613	PNL-SA—11804
	9:10660	NUREG/CR—3456
	USDOE Assistant Secretary for Environmental Protection, Safety and Emergency Preparedness, Washington, DC. Office of Operational Safety	
	9:10681	CONF-821215—(Aug 1983).
	Pacific Northwest Lab., Richland, WA (USA)	
	9:10692	PNL—4958
	9:10828	PNL-SA—11639
	9:10842	CONF-821215—(Aug 1983).
	9:10902	Health Physics 44 NO. Sup. 1. 411-417 (1983).
	9:10934	PNL-SA—11763
	9:10968	PNL-SA—11773
	9:11386	PNL-SA—9932
	9:11387	PNL-SA—11765
AC06-77RL01030	**Hanford Engineering Development Lab., Richland, WA (USA)**	
	9:9838	NUREG/CR—3391-Vol.1
AC07-76ID01570	**E G & G Idaho, Inc., Idaho Falls, ID**	
	9:9512	Nuclear and Chemical Waste Management 3 NO. 3. 141-148 (1982).
	EG and G Idaho, Inc., Idaho Falls (USA)	
	9:9734	EGG-M—23983
	9:9735	EGG-M—24883
	Utah Univ., Salt Lake City (USA). Research Inst.	
	9:9738	DOE/ID—10117
	9:9851	Nuclear Technology 62 NO. 2. 145-150 (Aug 1983).
	Idaho National Engineering Lab., Idaho Falls (USA)	
	9:9885	EGG-SAAM—6452
	EG and G Idaho, Inc., Idaho Falls (USA)	
	9:9886	EGG-TFBP—6279-Rev.1
	9:9887	GEND-INF—037-Vol.5
	9:10171	EGG-M—22883
	9:10629	EGG-M—05183
	9:11188	EGG-M—10483
	9:11287	EGG-M—10583
	9:11288	EGG-M—10683
	9:11289	EGG-M—23583
	9:11342	Physical Review Letters 51 NO. 19. 1757-1760 (7 Nov 1983).
	9:11374	EGG-IS—6478
AC07-81ID12317	**EG and G Idaho Inc.**	
	9:9869	AIChE (American Institute of Chemical Engineers) Symposium Series 79 NO. 225. 303-309 (198
AC08-76EV00703	**Hawaii Univ., Honolulu (USA). Office of Research Administration**	
	9:10706	DOE/EV/00703—5
AC08-81DP40146	**Westinghouse Research and Development Center, Pittsburgh, PA (USA)**	
	9:11277	CONF-831203—72
AC08-83NV10282	**EG and G, Inc., Goleta, CA (USA). Energy Measurements Group**	
	9:10580	EGG—10282-2026
	EG and G, Inc., Las Vegas, NV (USA). Energy Measurements Group	
	9:10684	EGG—10282-1021
	EG and G, Inc., Las Vegas, NV (USA). Remote Sensing Lab.	
	9:10685	EGG—10282-1024
AC09-76SR00001	**Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.**	
	9:9446	DP—1664
	9:9472	DP-MS—83-71
	9:9473	DP-MS—83-108
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	9:9474	DP-MS—83-110
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)	
	9:9475	DPSP—83-17-8
	9:9510	Nuclear and Chemical Waste Management 3 NO. 4. 199-204 (1982).
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	9:9514	DPST—83-209
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA)	
	9:9533	DPSPU—82-30-11
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	9:9864	DP-MS—83-80
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	9:9870	DPST—79-509
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.	
	9:10403	DP-MS—83-113
	9:10683	DPST—82-1054
	Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Plant	
	9:10739	DP-MS—83-98
AC09-76SR00819	**Savannah River Ecology Lab., Aiken, SC**	
	9:10753	Geochimica et Cosmochimica Acta 47 NO. 6. 1041-1049 (Jun 1983).
AC09-79ET41900	**Materials Research Laboratory, Pennsylvania State University, University Park, Pennsylvania**	
	9:9511	Nuclear and Chemical Waste Management 3 NO. 4. 229-234 (1982).
	9:10280	Nuclear and Chemical Waste Management 4 NO. Z. 171-176 (1983).
AC13-76GJ01664	**Du Pont de Nemours (E.I.) and Co., Aiken, SC (USA). Savannah River Lab.**	
	9:9443	GJBX—33(83)
	Bendix Field Engineering Corp., Grand Junction, CO (USA)	
	9:10313	GJ/TMC—10(83)

Contract No.	Abstract No.	Report No.
AC19-81BC10632	**Quadrex Corporation, Campbell, California**	
	9:9498	Nuclear and Chemical Waste Management 4 NO. 2. 189-199 (1983).
AC21-76ET10389	**C-E Power Systems, Windsor, CT (USA)**	
	9:10460	DOE/ET/10389—T25
AC21-79ET15457	**General Electric Co., Schenectady, NY (USA). Advanced Energy Programs Dept.**	
	9:10461	DOE/ET/15457—1447
AC21-80BC10197	**Univ. of Tulsa**	
	9:9330	Society of Petroleum Engineers of A.I.M.E. (American Institute of Mining, Metallurgical an
AC21-80ET14928	**General Electric Company, Corporate Research and Development, Schenectady, NY**	
	9:10433	AIChE (American Institute of Chemical Engineers) Symposium Series 79 NO. 225. 383-389 (198
AC21-80MC14129	**National Coal Board, Leatherhead (UK). Coal Utilization Research Lab.**	
	9:10462	DOE/MC/14129—1501
	9:10463	DOE/MC/14129—1502
AC21-81MC16140	**Alabama Univ., Tuscaloosa (USA). Dept. of Mineral Engineering**	
	9:9326	DOE/MC/16140—6
AC21-81MC16310	**Kansas State Univ., Manhattan**	
	9:10432	Chemical Engineering Science 38 NO. 4. 575-582 (1983).
AC21-82MC19163	**Scientific Design Co., Inc., New York (USA)**	
	9:9225	DOE/MC/19163—T11
	9:9226	DOE/MC/19163—T12
AC21-82MC19314	**Mississippi State Univ., Mississippi State (USA). MHD Energy Center**	
	9:9260	DOE/MC/19314—1457
AC22-80PC30013	**Pennsylvania State Univ., University Park (USA). Coal Research Section**	
	9:9261	DOE/PC/30013—11
AC22-81PC40787	**Colorado School of Mines, Golden (USA). Dept. of Chemical and Petroleum Refining Engineering**	
	9:9228	DOE/PC/40787—T3
AC22-82PC50041	**Catalytic, Inc., Wilsonville, AL (USA)**	
	9:9231	DOE/PC/50041—27
AC22-82PC50254	**Advanced Fuel Research, Inc., East Hartford, CT (USA)**	
	9:9302	DOE/PC/50254—T6
AC22-83PC62690	**Bituminous Coal Research, Inc., Monroeville, PA (USA). National Lab.**	
	9:9297	DOE/PC/62690—T2
AC44-80R420006	**Gebhard (Thomas G.), Austin, TX (USA)**	
	9:9562	DOE/R4/20006—T36
	9:9563	DOE/R4/20006—T37
	9:9564	DOE/R4/20006—T38
	9:9565	DOE/R4/20006—T39
	9:9566	DOE/R4/20006—T40
	9:9567	DOE/R4/20006—T41
	9:9568	DOE/R4/20006—T42
	9:9569	DOE/R4/20006—T43
	9:9570	DOE/R4/20006—T44
	9:9571	DOE/R4/20006—T45
	9:9572	DOE/R4/20006—T46
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	9:9576	DOE/R4/20006—T50
	9:9577	DOE/R4/20006—T51
	9:9578	DOE/R4/20006—T52
	9:9579	DOE/R4/20006—T53
AC85-81AP10036	**Kramer, Chin, and Mayo, Inc., Juneau, AK (USA)**	
	9:10034	DOE/AP/10036—T1
AC85-82AP10041	**Teshmont Consultants, Inc., Winnipeg, Manitoba (Canada)**	
	9:9766	DOE/AP/10041—T1
	9:9767	DOE/AP/10041—T2
AI01-77CS51040	**National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center**	
	9:10182	DOE/NASA/51040—49
	9:10183	DOE/NASA/51040—50
AI01-77ET20305	**National Aeronautics and Space Administration, Cleveland, OH (USA). Lewis Research Center**	
	9:9748	DOE/NASA/20305—9
AI01-80CS50194	**Little (Arthur D.), Inc., Cambridge, MA (USA)**	
	9:10131	DOE/NASA/0301—1
AI01-81CS50006	**Fauceett (Jack) Associates, Inc., Chevy Chase, MD (USA)**	
	9:10130	DOE/NASA/0295—1
AM01-79PE70106	**Harvard Univ., Cambridge, MA (USA)**	
	9:9338	DOE/PE/70106—T8
AM02-79CH10012	**Ford Aerospace & Communications Corporation, Aeronutronic Division, Newport Beach, CA**	
	9:9964	Proceedings, Interaociety Energy Conversion Engineering Conference 4 1690-1695 (Aug 1983).
AM03-76SF00034	**Ames Laboratory, USDOE**	
	9:10339	Metallurgical Transactions, [Section] B: Process Metallurgy 14B NO. 1. 5-17 (Mar 1983).
	9:10365	Journal of Physical Chemistry 87 NO. 13. 2329-2336 (23 Jun 1983).
	9:11162	Physical Review Letters 51 NO. 21. 1930-1932 (21 Nov 1983).
AM03-76SF00326	**Physics Department, Stanford University, Stanford, California 94305**	
	9:10981	Physical Review Letters 51 NO. 21. 1933-1936 (21 Nov 1983).
	9:11152	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:11393	Mathematics of Computation 41 NO. 164. 473-589 (Oct 1983).
AP07-79ID00019	**Massachusetts Inst. of Tech., Cambridge (USA)**	
	9:11325	PFC/RR—83-08
AS01-77CS40075	**Maryland Univ., College Park (USA)**	
	9:10138	DOE/CS/40075—T1
AS04-83ER60119	**New Mexico Univ., Albuquerque (USA)**	
	9:10845	DOE/ER/60119—T1
AS05-76ER05034	**Vanderbilt University, Nashville, TN 37235**	
	9:11130	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
AS05-77EV05572	**Old Dominion Univ., Norfolk, VA**	
	9:10728	Water Research 14 1263-1268 (1980).
	9:10729	Water Research 14 51-60 (1980).
	9:10730	Marine Chemistry (Amsterdam) 9 13-24 (1980).
	9:10731	Marine Chemistry (Amsterdam) 9 1-12 (1980).
AS05-78ER05776	**Virginia Univ., Charlottesville (USA). Dept. of Physics**	
	9:10990	DOE/ER/05776—12
AS05-78ER05947	**Florida Univ., Gainesville (USA)**	
	9:9323	CONF-800563—2
AS05-78ER06036	**Cyclotron Institute, Texas A & M University, College Station, Texas 77843**	
	9:11151	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N

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AS05-79ER10475	**Southwest Research Inst., San Antonio, TX (USA)**	
	9:10223	DOE/ER/10475—T2
AS05-80ER10635	**Virginia Univ., Charlottesville (USA). Dept. of Chemistry**	
	9:10312	DOE/ER/10635—3
AS05-80EV10340	**Maryland Univ., Baltimore (USA)**	
	9:10640	DOE/EV/10340—1
AS05-82ER12022	**Virginia Polytechnic Inst. and State Univ., Blacksburg (USA)**	
	9:10425	DOE/ER/12022—2
AS08-81DP40157	**Wisconsin Univ., Madison (USA). Dept. of Nuclear Engineering**	
	9:11282	DOE/DP/40157—1
AS09-76EV00890	**Skidaway Inst. of Oceanography, Savannah, GA (USA)**	
	9:10737	DOE/EV/00890—7
AS09-76EV00936	**Skidaway Inst. of Oceanography, Savannah, GA (USA)**	
	9:10726	DOE/EV/00936—7
AS09-80ER10678		
	9:10776	Journal of Molecular and Applied Genetics 1 301-314 (1982).
AT01-77CS40119	**National Engineering Lab. (NBS), Washington, DC (USA)**	
	9:10141	NBS-SP—542
	National Bureau of Standards, Washington, DC (USA). Inst. for Applied Technology	
	9:10142	NBSIR—76-1008
	National Bureau of Standards, Washington, DC (USA)	
	9:10143	NBSIR—81-2273
AT01-79CS10047	**Harvard Univ., Cambridge, MA (USA)**	
	9:10025	DOE/CS/10047—T8
AT03-76ER70278	**Technische Univ. Muenchen, Garching (Germany, F.R.). Inst. fuer Physikalische Chemie 1**	
	9:10765	CONF-8208165—1
AT03-76ET35300	**Brookhaven National Lab., Upton, NY (USA)**	
	9:9848	NUREG/CP—0045-Vol.2(1982).
AT03-76ET51011	**GA Technologies, Inc., San Diego, CA (USA)**	
	9:11291	GA-A—16844
	9:11292	GA-A—17010
AT03-76EV10017	**School of Engineering, University of Southern California, Los Angeles, CA**	
	9:9332	Proceedings, Intersociety Energy Conversion Engineering Conference 2 523-526 (Aug 1983).
AT03-76EV70032	**Stanford Univ., CA**	
	9:10785	Journal of Virology 47 NO. 2. 367-369 (Aug 1983).
AT03-76EV70035	**Rockwell International Corp., Canoga Park, CA (USA). Energy Systems Group**	
	9:10654	DOE/EV/70035—T2
AT03-76EV70264	**California Univ., Los Angeles (USA)**	
	9:10846	DOE/EV/70264—T1
AT03-76SF70046	**GA Technologies Inc., San Diego, California**	
	9:10409	Proceedings, Intersociety Energy Conversion Engineering Conference 4 1806-1811 (Aug 1983).
AT03-80ER53091	**SRI International, Menlo Park, CA (USA)**	
	9:11285	DOE/ER/53091—T9
	9:11286	DOE/ER/53091—T10
AT03-80SF11459	**Stanford Univ., Palo Alto, CA**	
	9:9329	Journal of Petroleum Technology 35 NO. 8. 1366-1372 (Jul 1983).
AT03-81ER10934	**Utah Univ., Salt Lake City (USA)**	
	9:10292	DOE/ER/10934—T1
AT03-81SF11528	**General Atomic Co., San Diego, CA (USA)**	
	9:9476	GA-A—16839
	GA Technologies, Inc., San Diego, CA (USA)	
	9:9477	GA-A—17009
AT06-76EV70024	**Univ. of Washington, Seattle**	
	9:10747	Geochimica et Cosmochimica Acta 47 NO. 5. 875-885 (May 1983).
AT20-81LC10650	**Department of Chemical Engineering, Washington State University**	
	9:9418	Proceedings, Intersociety Energy Conversion Engineering Conference 2 512-517 (Aug 1983).
EN-77-S-01-6173	**Univ. of Washington, Seattle**	
	9:10745	Geochimica et Cosmochimica Acta 47 NO. 6. 1013-1023 (Jun 1983).
FC01-77ET20261	**Risoe National Lab., Roskilde (Denmark)**	
	9:9746	DOE/ET/20261—T1
	9:9747	DOE/ET/20261—T2
FC01-77RG08084	**Carolina Power and Light Co., Raleigh, NC (USA)**	
	9:10065	DOE/RG/08084—T1
	Research Triangle Inst., Research Triangle Park, NC (USA)	
	9:10066	DOE/RG/08084—T1-Vol.1
	9:10067	DOE/RG/08084—T1-Vol.2
	9:10068	DOE/RG/08084—T2-Vol.2
	9:10069	DOE/RG/08084—T3-Vol.1
	9:10070	DOE/RG/08084—T3-Vol.2
	9:10125	DOE/RG/08084—T2-Vol.2-Pt.2
	9:10126	DOE/RG/08084—T2-Vol.2-Pt.3
FC01-79ER10000	**Texas Instruments Incorporated, Dallas, TX**	
	9:9635	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
FC01-80ET23197	**Solarex Corporation, Rockville, MD**	
	9:9644	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
	9:9654	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
FC05-77ET10069	**Exxon Research and Engineering Co., Florham Park, NJ (USA)**	
	9:9221	DOE/ET/10069—T79
FC07-76ET28419	**South Dakota School of Mines and Technology, Rapid City (USA). Dept. of Metallurgical Engineering**	
	9:9742	DOE/ET/28419—7
FC07-82ID12423	**FilmTec, Minneapolis, MN (USA)**	
	9:10140	DOE/ID/12423—T1
FG01-77CS69017	**Wisconsin Univ., Madison (USA). Extension**	
	9:10176	DOE/CS/69017—T1
FG01-78CS20423	**American Planning Association, Washington, DC**	
	9:10173	DOE/CS/20423—T2
FG01-78CS69008	**Idaho State Office of Energy, Boise (USA)**	
	9:10175	DOE/CS/69008—T1
FG01-78CS69037	**Hawaii State Government, Honolulu (USA)**	
	9:10055	DOE/CS/69037—T1
FG01-79CS50120	**West Virginia Univ., Morgantown (USA)**	
	9:10189	DOE/CS/50120—T1
FG01-80CS15003	**Bernhard Engineering, St. Louis, MO (USA)**	
	9:10135	DOE/CS/15003—T1
FG01-80CS15016	**Bailey Energy Systems, Inc., Haskell, NJ (USA)**	
	9:10136	DOE/CS/15016—T1
FG01-80CS22021	**Brabham, Kuhns, DeBay, West Palm Beach, FL (USA)**	
	9:10018	DOE/CS/22021—T1

Contract No.	Abstract No.	Report No.
FG01-80CS24402	Greater Washington Board of Trade, DC (USA)	
	9:10174	DOE/CS/24402—T1
FG01-82CE15087	Eastman (Gerald G.), Ochelata, OK (USA)	
	9:9325	DOE/CE/15087—T1
FG01-82CE15102	Research Consulting Associates, Lexington, MA (USA)	
	9:9768	DOE/CE/15102—T1-Pt.1
	9:9769	DOE/CE/15102—T1-Pt.2
FG01-82EI11547	Connecticut Office of Policy and Management, Hartford (USA). Energy Div.	
	9:9336	DOE/EI/11547—T1
FG02-79ER10532	Missouri Univ., Rolla (USA). Dept. of Electrical Engineering	
	9:9594	DOE/ER/10532—T1
FG02-79ET00086	Cornell Univ., Ithaca, NY (USA)	
	9:10767	DOE/ET/00086—1
FG02-80CS83101	Department of Biophysics, Michigan State University, East Lansing, Michigan	
	9:9618	Journal of the Electrochemical Society 130 NO. 1. 55-59 (Jan 1983).
FG02-80CS83111	Colorado Univ., Boulder (USA)	
	9:9720	DOE/CS/83111—T1
FG02-80CS89000	Massachusetts Univ., Amherst (USA). Dept. of Mechanical Engineering	
	9:9745	DOE/CS/89000—T1
FG02-80CS89003	Stevens Inst. of Tech., Hoboken, NJ (USA). Dept. of Mechanical Engineering	
	9:9753	ME-RT—82009
FG02-81R510309	Secord (Nelson W.), Brighton, MI (USA)	
	9:9749	DOE/R5/10309—2
	9:9750	DOE/R5/10309—3
FG05-80ET53088	Institute for Fusion Studies, University of Texas, Austin, Texas 78712	
	9:11255	Physical Review Letters 51 NO. 21. 1967-1970 (21 Nov 1983).
FG05-81OR20808	Renewable Energy, Inc., Paducah, KY (USA)	
	9:9545	DOE/OR/20808—T1
FG18-81FE05113	Louisiana Geological Survey, Baton Rouge (USA)	
	9:9289	DOE/FE/05113—T1
FG22-80PC30276	City Coll., New York (USA). Dept. of Chemical Engineering	
	9:9546	DOE/PC/30276—T1
	9:10356	DOE/PC/30276—T2
FG22-81PC40781	State Univ. of New York, Buffalo (USA). Dept. of Chemical Engineering	
	9:9227	DOE/PC/40781—T9
FG22-81PC40797	Rhode Island Univ., Kingston (USA). Dept. of Chemical Engineering	
	9:9229	DOE/PC/40797—T2
FG22-81PC40812	Western Kentucky Univ., Bowling Green (USA). Dept. of Chemistry	
	9:9230	DOE/PC/40812—T9
FG22-82PC50266	Carnegie-Mellon Univ., Pittsburgh, PA (USA). Dept. of Mechanical Engineering	
	9:9303	DOE/PC/50266—5
FG22-82PC50783	Battelle Columbus Labs., OH (USA)	
	9:9232	DOE/PC/50783—5
FG22-82PC50796	California Univ., Berkeley (USA). Dept. of Materials Science and Mineral Engineering	
	9:10427	DOE/PC/50796—T3
FG22-82PC50809	Lehigh Univ., Bethlehem, PA (USA). Dept. of Chemistry	
	9:9262	DOE/PC/50809—T4
FG22-82PC50810	Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering	
	9:9547	DOE/PC/50810—T5
FG22-82PC50816	Brigham Young Univ., Provo, UT (USA)	
	9:9536	DOE/PC/50816—5
FG22-83PC60779	Signal UOP, Inc., Des Plaines, IL (USA). Research Center	
	9:10347	DOE/PC/60779—1
FG22-83PC60781	SRI International, Menlo Park, CA (USA)	
	9:9233	DOE/PC/60781—1
FG22-83PC60795	Northwestern Univ., Evanston, IL (USA). Dept. of Chemistry	
	9:9537	DOE/PC/60795—1
FG22-83PC60803	Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering	
	9:9234	DOE/PC/60803—1
FG22-83PC60805	Pittsburgh Univ., PA (USA). Dept. of Chemical and Petroleum Engineering	
	9:9538	DOE/PC/60805—T1
FG44-80R410145	North Carolina Univ., Chapel Hill (USA)	
	9:10044	DOE/R4/10145—T1
FG44-80R410165	Plank (Don), St. Petersburg, FL (USA)	
	9:9659	DOE/R4/10165—T1
FG44-80R410343	Kennedy (Bobby W.), Guntersville, AL (USA)	
	9:9548	DOE/R4/10343—T1
	Kennedy (Bobby W.), Arab, AL (USA)	
	9:9549	DOE/R4/10343—T2
FG46-79R610968	Bangert (Thomas), Eureka Springs, AR (USA)	
	9:9701	DOE/R6/10968—T1
FG46-80R612018	Witt (Charles K.), Las Cruces, NM (USA)	
	9:9702	DOE/R6/12018—T1
NAS-7-100-954527	Springborn Labs., Inc., Enfield, CT (USA)	
	9:9596	DOE/JPL/954527—83/25
NAS-7-100-956046	Cornell Univ., Ithaca, NY (USA). Dept. of Materials Science and Engineering	
	9:9597	DOE/JPL/956046—83-17
NAS-7-100-956312	Mobil Solar Energy Corp., Waltham, MA (USA)	
	9:9598	DOE/JPL/956312—05
W-31-109-ENG-38	Argonne National Lab., IL (USA)	
	9:9220	ANL/MST—83-2
	9:9280	CONF-831203—91
	9:9457	ANL—83-57-Pt.2
	9:9761	CONF-831239—3
	9:9772	CONF-8209200—1
	9:9845	CONF-8310235—1
	9:9883	CONF-8309187—1
	9:9971	NUREG/CR—3553
	9:9976	CONF-8310239—1
	9:9986	CONF-8310237—1
	9:9987	CONF-8310238—2
	9:10004	CONF-8311111—1
	9:10046	ANL/MHD—83-1
	9:10049	Proceedings, Intersociety Energy Conversion Engineering Conference 4 1619-1623 (Aug 1983).
	9:10059	ANL/EES-TM—236-Vol.2
	9:10132	ANL-CT—80-3-Add.4
	9:10134	CONF-8310238—1
	9:10220	CONF-8309193—2
	9:10275	Physical Review [Section] B: Condensed Matter 28 NO. 9. 5342-5344 (1 Nov 1983).
	9:10311	CONF-840101—2
	9:10424	CONF-840201—7
	9:10529	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:10575	CONF-8310234—1
	9:10704	Soil Science Society of America Journal 46 NO. 6. 1340-1342 (Nov 1982).
	Wisconsin Univ., Milwaukee (USA). Center for Great Lakes Studies	
	9:10749	CONF-8309195—1
	Argonne National Lab., IL (USA)	
	9:10758	CONF-8304143—1
	9:10825	Journal of the American Chemical Society 105 NO. 9. 2903-2904 (4 May 1983).
	9:10840	CONF-820409—6
	9:10901	Health Physics 44 NO. Sup. 1. 323-341 (1983).

Contract No.	Abstract No.	Report No.
	9:10936	Bulletin of Environmental Contamination and Toxicology 30 NO. 4. 448-455 (Apr 1983).
	9:10944	Toxicology and Applied Pharmacology 66 368-375 (1982).
	9:11051	ANL-HEP-CP—83-50
	9:11052	CONF-8311112—1
	9:11053	CONF-8311113—1
	9:11090	ANL-HEP-CP—83-61
	9:11132	Physical Review Letters 51 NO. 20. 1858-1861 (14 Nov 1983).
	9:11145	Physical Review [Section] C: Nuclear Physics 28 NO. 5. 2162-2164 (Nov 1983).
	9:11260	ANL/FPP—83-1-Vol.1
	9:11261	ANL/FPP—83-1-Vol.2
	9:11268	CONF-831203—39
	9:11365	ANL—83-96
	9:11366	ANL/MCS-TM—10
W-7405-ENG-26	**Oak Ridge National Lab., TN (USA)**	
	9:9281	CONF-831244—1
	9:9316	CONF-8209202—1-Draft
	9:9445	CONF-8308150—1
	9:9469	CONF-8311125—1
	9:9487	ORNL/TM—8376
	9:9500	Nuclear and Chemical Waste Management 4 NO. 2. 129-134 (1983).
	9:9535	CONF-831205—5
	9:9558	ORNL/TM—8722
	9:9640	Conference Record of the IEEE (Institute of Electrical and Electronics Engineers) Photovol
	New Mexico Univ., Albuquerque (USA). Dept. of Mechanical Engineering	
	9:9696	CONF-831016—2
	9:9709	Solar Energy 30 NO. 6. 545-554 (Jun 1983).
	9:9787	Journal of Pressure Vessel Technology 105 NO. 2. 102-110 (May 1983).
	Brookhaven National Lab., Upton, NY (USA)	
	9:9795	NUREG/CP—0045-Vol.2(1982).
	9:9822	American Society of Mechanical Engineers, Pressure Vessels and Piping Division, [Technical
	Oak Ridge National Lab., TN (USA)	
	9:9823	CONF-821148—4
	9:9879	CONF-821106—34
	9:9882	CONF-831047—91
	9:9911	NUREG/CR—3492-Vol.2
	9:9952	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:9953	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:9954	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10014	NUREG/CR—3430-Vol.1
	9:10017	Energy (Oxford) 7 NO. 11. 897-907 (Nov 1982).
	9:10021	Energy (Oxford) 8 NO. 10. 775-780 (Oct 1983).
	9:10033	CONF-8306162—1
	9:10063	DOE/NBM—4004078
	9:10064	DOE/NBM—4004262
	Little (Arthur D.), Inc., Cambridge, MA (USA)	
	9:10072	ORNL/Sub—80-13836/1-02
	Portland Cement Association, Skokie, IL (USA). Construction Technology Labs.	
	9:10073	ORNL/SUB—42539/3

Contract No.	Abstract No.	Report No.
	9:10083	Proceedings, Intersociety Energy Conversion Engineering Conference 5 2010-2014 (Aug 1983).
	9:10085	Proceedings, Intersociety Energy Conversion Engineering Conference 5 2050-2058 (Aug 1983).
	9:10116	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10117	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10118	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10119	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10120	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10124	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	Oak Ridge National Lab., TN (USA)	
	9:10133	CONF-811108—25
	9:10164	ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) Transac
	9:10177	ORNL—5984
	9:10184	Proceedings, Intersociety Energy Conversion Engineering Conference 2 708-713 (Aug 1983).
	9:10185	Proceedings, Intersociety Energy Conversion Engineering Conference 2 779-784 (Aug 1983).
	9:10187	Proceedings, Intersociety Energy Conversion Engineering Conference 2 914-917 (Aug 1983).
	9:10219	CONF-831259—1
	9:10257	Metallurgical Transactions, [Section] A: Physical Metallurgy and Materials Science 14A 104
	9:10277	Journal of the American Ceramic Society 66 NO. 6. 424-433 (Jun 1983).
	9:10305	Physical Review [Section] B: Condensed Matter 28 NO. 9. 5361-5364 (1 Nov 1983).
	Oak Ridge Gaseous Diffusion Plant, TN (USA)	
	9:10349	K/OA—5578
	9:10368	Journal of the American Chemical Society 105 NO. 9. 2843-2850 (4 May 1983).
	Oak Ridge National Lab., TN (USA)	
	9:10517	ORNL/TM—8952
	9:10611	ORNL/TM—8986
	9:10650	CONF-821215—(Aug 1983).
	9:10651	CONF-821215—(Aug 1983).
	9:10653	CONF-8310240—3
	9:10671	Atmospheric Environment 17 NO. 4. 789-796 (1983).
	9:10691	NUREG/CR—3332
	9:10703	CONF-8303114—1
	9:10719	Health Physics 44 NO. 5. 541-552 (May 1983).
	9:10735	CONF-821215—(Aug 1983).
	9:10736	CONF-8306160—1
	9:10759	Energy (Oxford) 7 NO. 12. 991-1003 (Dec 1982).

Contract No.	Abstract No.	Report No.
	9:10763	CONF-821269—1
	9:10764	CONF-831258—2
	9:10774	Journal of Biological Chemistry 257 NO. 24. 14811-14816 (25 Dec 1982).
	9:10775	Archives of Biochemistry and Biophysics 219 NO. 2. 422-437 (Dec 1982).
	9:10786	Chromosoma 87 149-164 (1982).
	9:10833	Cellular Immunology 70 1-10 (1982).
	9:10834	Chromosoma 87 49-75 (1982).
	Tennessee Univ., Oak Ridge (USA). Graduate School of Biomedical Sciences	
	9:10843	CONF-831258—1
	Oak Ridge National Lab., TN (USA)	
	9:10917	CONF-831258—3
	9:10918	CONF-8310240—1
	9:10919	CONF-8310242—1
	9:10933	ORNL/TM—8881
	9:10938	American Journal of Pathology 109 NO. 3. 321-329 (Dec 1982).
	9:10939	JNCI, Journal of the National Cancer Institute 69 NO. 5. 1155-1161 (Nov 1982).
	9:10942	Biochimica et Biophysica Acta 699 40-48 (1982).
	9:10951	ORNL—5962
	9:11138	Physical Review Letters 51 NO. 20. 1850-1853 (14 Nov 1983).
	9:11183	CONF-820944—10
	9:11184	CONF-821103—96-Draft.
	9:11185	CONF-831203—69
	9:11187	DOE/NBM—3017242
	9:11262	CONF-820948—14
	9:11263	CONF-821108—35
	9:11264	CONF-830795—8
	9:11265	CONF-830942—78
	9:11266	CONF-831171—17
	9:11267	CONF-831180—8
	9:11269	CONF-831203—56
	9:11270	CONF-831203—57
	9:11271	CONF-831203—58
	9:11272	CONF-831203—59
	9:11273	CONF-831203—60-Draft
	Grumman Aerospace Corp., Bethpage, NY (USA)	
	9:11274	CONF-831203—62
	Oak Ridge National Lab., TN (USA)	
	9:11275	CONF-831203—67
	9:11276	CONF-831203—68
	9:11278	CONF-831203—73-Draft
	Varian Associates, Inc., Palo Alto, CA (USA)	
	9:11279	CONF-831257—1
	Oak Ridge National Lab., TN (USA)	
	9:11280	CONF-8311111—2-Draft
	9:11281	CONF-8311111—3
	9:11358	ADSM—18-P46FD
	9:11359	CONF-8310243—1
	9:11368	CONF-8310244—1
W-7405-ENG-36	**Los Alamos National Lab., NM (USA)**	
	9:9481	LA-UR—83-3402
	9:9521	LA—9821-PR
	9:9524	NUREG/CR—3522-Vol.2
	9:10196	LA—9829-MS
	9:10271	LA-UR—83-3717
	9:10472	NUREG/CR—3242
	9:10493	LA—9901-MS
	9:10631	LA-UR—83-3477
	9:10638	LA-UR—83-3520
	9:10771	LA-UR—83-3481
	9:10926	LA-UR—83-3583
	Preston Polytechnic (UK). Div. of Physics and Astronomy	
	9:10978	LA-UR—83-3621
	Los Alamos National Lab., NM (USA)	
	9:10985	LA-UR—83-2515
	9:10986	LA-UR—83-3239
	9:11046	LA-UR—83-2113
	9:11047	LA-UR—83-3523
	9:11086	LA-UR—83-3250
	9:11175	LA-UR—83-2295
	9:11179	Journal of the Optical Society of America 73 NO. 11. 1501-1509 (Nov 1983).
	9:11181	LA-UR—83-3545
	9:11229	LA-UR—83-3480
	9:11250	LA-tr—84-3(1984).
	9:11251	LA-tr—84-2(1984).
	9:11316	LA-UR—83-2691
	9:11317	LA-UR—83-3470
	9:11318	LA-UR—83-3476
	9:11319	LA-UR—83-3489
	9:11320	LA-UR—83-3490
	9:11321	LA-UR—83-3505
	9:11382	LA-UR—83-3396
	9:11383	LA-UR—83-3397
	9:11396	LA-UR—83-3395
W-7405-ENG-48	**Lawrence Livermore National Lab., CA (USA)**	
	9:9373	UCID—19953-Vol.1
	9:9492	UCID—19968
	North Carolina State Univ., Raleigh (USA). Dept. of Materials Engineering	
	9:9493	UCRL—15516
	9:9499	Nuclear and Chemical Waste Management 4 NO. 2. 141-145 (1983).
	Lawrence Livermore National Lab., CA (USA)	
	9:9530	UCRL—89212-Rev.1
	9:9542	Chemical Engineering Science 38 NO. 4. 597-605 (1983).
	9:9710	Journal of Solar Energy Engineering 105 NO. 2. 217-223 (May 1983).
	Brown and Root Development, Inc., San Francisco, CA (USA)	
	9:9759	UCRL—15568-1
	Lawrence Livermore National Lab., CA (USA)	
	9:9910	NUREG/CR—3480
	9:9915	UCID—19958
	9:9916	UCRL—86245-Rev.1
	General Dynamics Corp., Groton, CT (USA). Electric Boat Div.	
	9:9945	CONF-830430—3
	General Electric Co., Philadelphia, PA (USA). Space Systems Div.	
	9:9946	UCRL—15566
	9:10042	Energy (Oxford) 8 NO. 3. 235-243 (Mar 1983).
	Lawrence Livermore National Lab., CA (USA)	
	9:10246	UCRL—89476
	9:10247	UCRL—90093
	9:10308	UCRL—90099
	9:10336	UCRL—89459
	9:10406	UCRL—89986
	S-Cubed, La Jolla, CA (USA)	
	9:10430	UCRL—15567
	Lawrence Livermore National Lab., CA (USA)	
	9:10431	UCRL—89400
	9:10441	UCID—19323-83-2
	9:10442	International Advances in Nondestructive Testing 9 159-176 (1983).
	9:10445	UCRL—89299-Rev.1
	9:10454	UCID—19925
	Brown and Root Development, Inc., San Francisco, CA (USA)	
	9:10455	UCRL—15568-2
	Lawrence Livermore National Lab., CA (USA)	
	9:10456	UCRL—89507
	9:10457	UCRL—89838
	9:10473	UCID—19952
	Lawrence Berkeley Lab., CA (USA)	
	9:10496	UCRL—89214-Rev.1

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	Lawrence Livermore National Lab., CA (USA)	
	9:10497	UCRL—89471-Rev.1
	9:10635	UCID—19964
	9:10672	AIChE (American Institute of Chemical Engineers) Symposium Series 79 NO. 225. 390-399 (198
	9:10742	NUREG/CR—3478
	9:10773	UCRL—90106
	9:10931	NUREG/CR—3477
	9:10935	UCRL—88687
	9:10943	Toxicology 25 271-287 (1982).
	9:10963	UCRL—89190
	9:10982	Journal of the British Astronomical Association 92 NO. 5. 209-215 (1982).
	9:11043	IEEE (Institute of Electrical and Electronics Engineers) Transactions on Nuclear Science N
	9:11048	UCID—19960
	9:11134	Physical Review [Section] C: Nuclear Physics 28 NO. 5. 1934-1946 (Nov 1983).
	9:11139	UCID—19973
	9:11143	UCID—19966
	9:11148	UCID—19972
	9:11247	UCID—19943
	9:11248	UCRL—89430
	9:11331	UCID—19948
	9:11332	UCRL—15565
	9:11333	UCRL—15571
	9:11334	UCRL—89285
	9:11335	UCRL—89433
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	9:11337	UCRL—89759
	9:11338	UCRL—89987
	9:11339	UCRL—90059
	9:11340	UCRL—90092
	9:11341	UCRL—90109
	General Electric Co., Sunnyvale, CA (USA)	
	9:11391	UCRL—15570
	Lawrence Livermore National Lab., CA (USA)	
	9:11392	UCRL—90030
	9:11399	UCID—19933
W-7405-ENG-82	**Lawrence Berkeley Laboratory, Berkeley CA**	
	9:10054	Metallurgical Transactions, [Section] B: Process Metallurgy 14B NO. 1. 63-70 (Mar 1983).
	9:10260	Metallurgical Transactions, [Section] B: Process Metallurgy 14B NO. 1. 25-32 (Mar 1983).
	9:10261	Metallurgical Transactions, [Section] B: Process Metallurgy 14B NO. 1. 95-100 (Mar 1983).
W-7405-ENG-92	**Battelle Columbus Labs., OH (USA)**	
	9:10170	DOE/NBM—4005357

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The numbers assigned to reports cited in this publication appear in the first column of the index. Cross reference information and/or availability are included as appropriate. Abbreviations used in the availability column are elaborated at the end of the index. To expedite the filling of orders for reports from NTIS and TIC, an order number in the form, DE82000001, appears in column 3. Requesters are urged to use this order number where provided. In column 4, one or more DOE distribution categories are indicated, e.g. , STD-10, MN-25. STD indicates distribution was made in full-size copy; MN indicates microcopy distribution. These category numbers are included to assist DOE librarians in responding to requests for reports in their collections. The UC (Unclassified Distribution Categories) are defined in DOE/TIC-4500, available from TIC. The citation numbers are given in column 5. NOTE: DOE attempts to disseminate its information as broadly as possible. Even though a report may contain some degree of illegibility, it is believed that the report may still make a contribution. The presence of a 1, 2, or 3 following NTIS in the availability column denotes the extent to which a report may be illegible and the form in which it is available: 1 = 1 to 5% illegibility, available PC and MF; 2 = 6 to 10% illegibility, available MF only; 3 = 11% or more illegibility, available PC only.

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	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1893-1898(Apr 1981)			9:10820
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1899-1901(Apr 1981)			9:10821
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1902-1905(Apr 1981)			9:10822
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1921-1923(Apr 1981)			9:10823
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1392-1395(Apr 1981)			9:10824
	IEEE Trans. Nucl. Sci., No. 2, 1074-1077(1982)			9:11015
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1117-1118(Apr 1981)			9:11016
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1260-1263(Apr 1981)			9:11017
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1225-1226(Apr 1981)			9:11018
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1194-1197(Apr 1981)			9:11019
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1485-1487(Apr 1981)			9:11020
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1230-1232(Apr 1981)			9:11021
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1156-1158(Apr 1981)			9:11022
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1098-1102(Apr 1981)			9:11023
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1103-1108(Apr 1981)			9:11024
	IEEE Trans. Nucl. Sci., NS-28: 1109-1111(Apr 1981)			9:11025
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1114-1116(Apr 1981)			9:11026
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1122-1125(Apr 1981)			9:11027
	IEEE Trans. Nucl. Sci., No. 2, 1126-1130(Apr 1981)			9:11028
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1135-1138(Apr 1981)			9:11029
	IEEE Trans. Nucl. Sci., No. 2, 1143-1145(Apr 1981)			9:11030
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1146-1148(Apr 1981)			9:11031
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1149-1151(Apr 1981)			9:11032
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1095-1097(Apr 1981)			9:11033
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1066-1068(Apr 1981)			9:11034
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1063-1065(Apr 1981)			9:11035
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1069-1071(Apr 1981)			9:11036
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1078-1080(Apr 1981)			9:11037
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1081-1083(Apr 1981)			9:11038
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1084-1088(Apr 1981)			9:11039
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1029-1031(Apr 1981)			9:11040
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1053-1055(Apr 1981)			9:11041
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1056-1058(Apr 1981)			9:11042
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1059-1062(Apr 1981)			9:11043
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1190-1193(Apr 1981)			9:11044
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1250-1254(Apr 1981)			9:11127
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1273-1278(Apr 1981)			9:11130
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1255-1259(Apr 1981)			9:11146
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1036-1038(Apr 1981)			9:11151

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	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1152-1155(Apr 1981)			9:11152
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1614-1620(Apr 1981)			9:11158
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1366-1368(Apr 1981)			9:11257
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1350-1353(Apr 1981)			9:11258
	IEEE Trans. Nucl. Sci., NS-28: No. 2, 1323-1325(Apr 1981)			9:11349
CONF-8011199-	(Seminar on energy policy in business, St. Gallen, Switzerland, 7 Nov 1980)			
	See CONF-8010351-	DE84770123	MN -13	9:9975
CONF-8011200-	(Seminar on energy policy in business, Bern, Switzerland, 14 Nov 1980)			
	See CONF-8010351-	DE84770123	MN -13	9:9975
CONF-810308-	(American Chemical Society symposium on the chemistry of engine combustion deposits, Atlanta, GA, USA, 29 Mar-3 Apr 1981)			
Vol.5	Washington, DC; American Chemical Society (1982).			9:9270
CONF-8103182-	(Workshop on ecosystem modelling, Naples, Italy, 28 Mar-10 Apr 1981)			
Summ.	*See* BNL-33356	DE84002431	MN -11	9:10725
CONF-8104228-	(17. annual meeting of National Council on Radiation Protection and Measurements, Bethesda, MD, USA, 8-9 Apr 1981)			
1	*See* BNL-33792	DE84002882	MN -41	9:10839
CONF-8105160-	(Seminar on the development of radioprotection techniques for nuclear energy workers, Cadarache, France, 5-7 May 1981)			
4	*See* CEA-CONF-6627	DE83704323	MN -41	9:9875
CONF-8106308-	(Advisory group meeting on pathways for radionuclide releases of regional and world-wide interest, Vienna, Austria, 2-5 Jun 1981)			
	See IAEA-TECDOC-279	DE83704119	MN -48	9:10686
CONF-8109144-	(6. international seminar on high energy physics problems: multiquark interactions and quantum chromodynamics, Dubna, USSR, 15-19 Sep 1981)			
	See JINR-D-1,2-81-728	DE84780054	MN -34D	9:11050
CONF-8109148-	(General meeting on welding engineering, Essen, F.R. Germany, 16-18 Sep 1981)			
	Available from Deutscher Verband fuer Schweisstechnik e.V., Duesseldorf (Germany, F.R.)			9:10263
CONF-8110279-	(67. national conference of the Italian Society of Physics, Pisa, Italy, 3-13 Oct 1981)			
1	*See* CNEN-RT/PROT-81-28	DE83900297	MN -41	9:11153
CONF-811108-	(Annual meeting of the American Institute of Chemical Engineers, New Orleans, LA, USA, 8-12 Nov 1981)			
25	NTIS, PC A02/MF A01	DE84004390	MN -95e	9:10133
CONF-811140-	(Workshop on stability of superconductors in He-I and He-II, Saclay, France, 16-19 Nov 1981)			
	Paris, France; Institut International du Froid (1981).			9:10420
CONF-820217-	(9. energy technology conference, Washington, DC, USA, 16-18 Feb 1982)			
	Energy Technol. (Wash., D.C.), 9: 1297-1307(Jun 1982)			9:10190
CONF-820318-	(Conference on human factors in computer systems, Washington, DC, USA, 15-17 Mar 1982)			
4	*See* PNL-SA-9932	DE83002710	MN -32	9:11386
CONF-820409-	(Scanning electron microscopy annual meeting, Anaheim, CA, USA, 25-30 Apr 1982)			
6	NTIS, PC A02/MF A01; 1	DE84003454	MN -48	9:10840
CONF-820465-	(44. annual meeting of the American Power Conference, Chicago, IL, USA, 26-28 Apr 1982)			
	Proc. Am. Power Conf., 44: 861-863(May 1982)			9:9502
	Proc. Am. Power Conf., 44: 801-805(May 1982)			9:9821
	Proc. Am. Power Conf., 44: 468-472(May 1982)			9:10048
	Proc. Am. Power Conf., 44: 655-659(May 1982)			9:10115
CONF-8205220-	(STP symposium, Ottawa, Canada, 1 May 1982)			
1	*See* TRITA-EPP-82-09	DE83704460	MN -20	9:10980
CONF-8205225-	(Conference on nuclear energy - what do you know about it, Enschede, Netherlands, 11 May 1982)			
	See INIS-mf-8649	DE84780051	MN -41	9:10008
CONF-820601-	(ASME pressure vessel and piping conference, Orlando, FL, USA, 27 Jun-1 Jul 1982)			
	Am. Soc. Mech. Eng., Pressure Vessels Piping Div., [Tech. Rep.] PVP, PVP-VOL.-59: 57-66(1982)			9:9822
	Am. Soc. Mech. Eng., [Pap.], 82-PVP-2: 9(1982)			9:10417
	Am. Soc. Mech. Eng., [Pap.], 82-PVP-6: 12(1982)			9:10418
CONF-820618-	(International conference on plasma physics, Goeteborg, Sweden, 7-21 Jun 1982)			
16	*See* TRITA-EPP-82-10	DE83704461	MN -20	9:11238
CONF-820650-	(3. Japan/US HTGR safety technology seminar, Upton, NY, USA, 2-3 Jun 1982)			
Vol.2	*See* NUREG/CP-0045-Vol.2	DE84000513	MN -77	9:9904
CONF-820705-	(2. joint ASME/ANS nuclear engineering conference, Portland, OR, USA, 25-28 Jul 1982)			
	Am. Soc. Mech. Eng., [Pap.], 82-NE-6: 6(1982)			9:9453
	Am. Soc. Mech. Eng., [Pap.], 82-NE-9: 8(1982)			9:9454
	Am. Soc. Mech. Eng., [Pap.], 82-NE-8: 7(1982)			9:9508
	Am. Soc. Mech. Eng., [Pap.], 82-NE-10: 8(1982)			9:9509

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CONF-820814-	(17. Intersociety Energy Conversion Engineering conference, Los Angeles, CA, USA, 8-13 Aug 1982)			
	Proc., Intersoc. Energy Convers. Eng. Conf., 1: 70-76(Aug 1983)			9:9660
	Proc., Intersoc. Energy Convers. Eng. Conf., 3: 1160-1165(Aug 1982)			9:10163
	Proc., Intersoc. Energy Convers. Eng. Conf., 3: 1166-1171(Aug 1982)			9:10415
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1885-1893(Sep 1982)			9:10474
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1681-1687(Sep 1982)			9:10475
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1801-1806(Aug 1982)			9:10476
CONF-8208153-	(18. meeting of the European Seismological Commission, Leeds, UK, 23-27 Aug 1982)			
1	*See* CEA-CONF-6628	DE83704125	MN -41	9:9876
CONF-8208158-	(IAEA meeting on conditioning requirements for storage and disposal of radioactive wastes, Vienna, Austria, 23-27 Aug 1982)			
	See IAEA-TECDOC-285	DE83704589	MN -70	9:9479
CONF-8208165-	(International conference on time-resolved vibrational spectroscopy, Lake Placid, NY, USA, 1 Aug 1982)			
1	NTIS, PC A02/MF A01	DE84003707	MN -4	9:10765
CONF-820906-	(16. IEEE photovoltaics specialists conference, San Diego, CA, USA, 28-30 Sep 1982)			
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1051-1056(Sep 1982)			9:9624
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1066-1071(Sep 1982)			9:9625
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1106-1110(Sep 1982)			9:9626
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1117-1123(Sep 1982)			9:9627
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1138-1142(Sep 1982)			9:9628
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 63-67(Sep 1982)			9:9629
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 68-73(Sep 1982)			9:9630
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 86-89(Sep 1982)			9:9631
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 115-118(Sep 1982)			9:9632
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 119-122(Sep 1982)			9:9633
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 123-127(Sep 1982)			9:9634
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 257-262(Sep 1982)			9:9635
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 289-294(Sep 1982)			9:9636
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 361-365(Sep 1982)			9:9637
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 384-390(Sep 1982)			9:9638
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 411-416(Sep 1982)			9:9639
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 427-430(Sep 1982)			9:9640
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 448-453(Sep 1982)			9:9641
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 459-462(Sep 1982)			9:9642
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 525-531(Sep 1982)			9:9643
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 548-553(Sep 1982)			9:9644
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 554-558(Sep 1982)			9:9645
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 574-577(Sep 1982)			9:9646
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 584-589(Sep 1982)			9:9647
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1252-1255(Sep 1982)			9:9648
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1268-1276(Sep 1982)			9:9649
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1284-1287(Sep 1982)			9:9650
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1293-1298(Sep 1982)			9:9651
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1389-1393(Sep 1982)			9:9652
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1421-1422(Sep 1982)			9:9653
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1463-1464(Sep 1982)			9:9654

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	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1468-1469(Sep 1982)			9:9655
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1470-1473(Sep 1982)			9:9636
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1256-1261(Sep 1982)			9:9657
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 955-960(Sep 1982)			9:9662
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 988-992(Sep 1982)			9:9663
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1014-1019(Sep 1982)			9:9664
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1036-1040(Sep 1982)			9:9665
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 199-204(Sep 1982)			9:9666
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 188-193(Sep 1982)			9:9667
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 246-252(Sep 1982)			9:9668
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 253-256(Sep 1982)			9:9669
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 263-269(Sep 1982)			9:9670
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 276-280(Sep 1982)			9:9671
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 281-288(Sep 1982)			9:9672
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 378-383(Sep 1982)			9:9673
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 391-395(Sep 1982)			9:9674
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1176-1182(Sep 1982)			9:9675
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1189-1197(Sep 1982)			9:9676
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1198-1207(Sep 1982)			9:9677
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1344-1349(Sep 1982)			9:9678
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1355-1361(Sep 1982)			9:9679
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1362-1367(Sep 1982)			9:9680
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 1456-1458(Sep 1982)			9:9681
	Conf. Rec. IEEE Photovoltaic Spec. Conf., 316-326(Sep 1982)			9:10307
CONF-820927-	(57. AIME Society of Petroleum Engineers annual technical conference and exhibition, New Orleans, LA, USA, 26-29 Sep 1982)			
	Soc. Pet. Eng. AIME, Pap., SPE11095: 1-8(Sep 1982)			9:9341
	Soc. Pet. Eng. AIME, Pap., SPE11224: 1-14(Sep 1982)			9:9366
	Soc. Pet. Eng. AIME, Pap., SPE11220: 1-13(Sep 1982)			9:9367
	Soc. Pet. Eng. AIME, Pap., SPE11183: 1-8(Sep 1982)			9:9381
	Soc. Pet. Eng. AIME, Pap., SPE11184: 1-15(Sep 1982)			9:9382
	Soc. Pet. Eng. AIME, Pap., SPE11182: 1-11(Sep 1982)			9:9416
	Soc. Pet. Eng. AIME, Pap., SPE11155: 1-9(Sep 1982)			9:9740
	Soc. Pet. Eng. AIME, Pap., SPE11137: 1-16(Sep 1982)			9:9741
CONF-820944-	(Workshop on diagnostics for fusion reactor conditions (International school of plasma physics), Varenna, Italy, 6-17 Sep 1982)			
10	NTIS, PC A02/MF A01	DE84004450	MN -20a	9:11183
CONF-820948-	(12. symposium on fusion technology, Juelich, F.R. Germany, 13-17 Sep 1982)			
14	NTIS, PC A02/MF A01	DE84004460	MN -20a	9:11262
CONF-820980-	(European Committee of future accelerators - the challenge of ultra-high energies conference, Oxford, UK, 27-30 Sep 1982)			
6	*See* IC-82/215	DE83704489	MN -34D	9:11055
7	*See* RL-82-109	DE83704564	MN -28	9:10483
CONF-820985-	(8. European conference on thermophysical properties - high temperatures high pressures, Baden-Baden, F.R. Germany, 27 Sep-1 Oct 1982)			
5	*See* CEA-CONF-6623	DE83704124	MN -41	9:9874
CONF-8209119-	(International symposium on detailed modelization of fluid flow, Paris, France, 7-10 Sep 1982)			
2	*See* CEA-CONF-6728	DE84750323	MN -38	9:10423
CONF-8209171-	(International symposium on multiwire detector application, Prague, Czechoslovakia, 1 Sep 1982)			
1	*See* JINR-R-13-82-634	DE83704177	MN -37	9:10390
CONF-8209199-	(25. NEACRP meeting, Karlsruhe, F.R. Germany, 13 Aug-17 Sep 1982)			
1	*See* CEA-CONF-6741	DE84750309	MN -79	9:9816
2	*See* CEA-CONF-6740	DE84750314	MN -80	9:9831

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3	*See* CEA-CONF-6739	DE84750315	MN -79	9:9853
4	*See* CEA-CONF-6738	DE84750316	MN -79	9:9815
CONF-8209200-	(ASM Canadian Council and Canadian Nuclear Society conference on materials in nuclear energy, Huntsville, Canada, 29 Sep-2 Oct 1982)			
1	NTIS, PC A02/MF A01	DE84004029	MN -78	9:9772
CONF-8209202-	(ORNL life sciences symposium, Gatlinburg, TN, USA, 1 Sep 1982)			
1-Draft	NTIS, PC A03/MF A01	DE84004903	MN -90i	9:9316
CONF-821065-	(Topical meeting on nuclear fluid dynamics ICTP, Trieste, Italy, 11-15 Oct 1982)			
4	*See* ISN-82-42	DE84750297	MN -34C	9:11142
CONF-821068-	(10. liquid metal boiling working group meeting, Karlsruhe, F.R. Germany, 27-29 Oct 1982)			
3	*See* CEA-CONF-6733	DE84750310	MN -79	9:9843
CONF-8210185-	(International symposium on the role of technology assessment in the decision-making process, Bonn, F.R. Germany, 19-21 Oct 1982)			
Summ.	Berlin, Germany; Unweltbundesamt (1983).			9:11364
CONF-8210190-	(Workshop on Alfven's critical velocity effect, Garching bei Muenchen, F.R. Germany, 11 Oct-13 Nov 1982)			
1	*See* TRITA-EPP-82-14	DE83704464	MN -20	9:11240
CONF-8210193-	(Workshop on theoretical biology and medicine, Angers, France, 11-13 Oct 1982)			
1	*See* CEA-CONF-6549	DE83704330	MN -48	9:10793
CONF-8210194-	(International workshop on the design, construction, and operation of solar central receiver projects, Claremont, CA, USA, 19-22 Oct 1982)			
	See SAND-82-8048	DE84000626	STD -62c	9:9689
CONF-821101-	(ASME winter annual meeting (Engineering applications of laser velocimetry/published in ASME Jr. Fluid Engineering), Phoenix, AZ, USA, 14-19 Nov 1982)			
23	*See* CEA-CONF-6734	DE84750317	MN -79	9:9814
CONF-821103-	(American Nuclear Society winter meeting, Washington, DC, USA, 14-19 Nov 1982)			
96-Draft.	NTIS, PC A02/MF A01; 1	DE84004459	MN -20f	9:11184
CONF-821106-	(Annual meeting of heat transfer and energy conversion (American Inst of Chemical Engineers), Los Angeles, CA, USA, 14-18 Nov 1982)			
34	NTIS, PC A02/MF A01	DE84004387	MN -78	9:9879
CONF-821108-	(Applied superconductivity conference, Knoxville, TN, USA, 30 Nov-3 Dec 1982)			
35	NTIS, PC A02/MF A01	DE84004587	MN -20b	9:11263
CONF-821148-	(National Research Council symposium on advanced compact reactor systems, Washington, DC, USA, 15-17 Nov 1982)			
4	NTIS, PC A03/MF A01	DE84003319	MN -80	9:9823
CONF-8211134-	(Meeting on semi-liquid manure treatment, energy engineering and preservation of feeding stuffs, Vilshofen, F.R. Germany, 9-10 Nov 1982)			
	NTIS (US Sales Only), PC A06/MF A01; 1	DE84770094	MN -61a	9:9591
CONF-821215-	(4. DOE environmental protection information meeting, Denver, CO, USA, 7-9 Dec 1982)			
	NTIS, PC A24/MF A01; 1	DE83017117	MN -11	9:10680
CONF-821262-	(Seminar on fuel upgrading, Aachen, F.R. Germany, 16 Dec 1982)			
1	NTIS (US Sales Only), PC A03/MF A01	DE84770102	MN -92b	9:9331
CONF-821266-	(3. semi-annual workshop on the leaching mechanisms of defense high-level waste forms, Thousand Oaks, CA, USA, 7-8 Dec 1982)			
1	*See* DP-MS-83-108	DE84003690	MN -70	9:9473
CONF-821269-	(American Society of Zoologists conference, Louisville, KY, USA, 27-30 Dec 1982)			
1	NTIS, PC A03/MF A01; 1	DE84004429	MN -48	9:10763
CONF-830210-	(5. topical conference on radio frequency plasma heating, Madison, WI, USA, 21-23 Feb 1983)			
21	*See* GA-A-17010	DE84004892	MN -20a	9:11292
CONF-830223-	(Wire chamber conference, Vienna, Austria, 15-18 Feb 1983)			
8	*See* CEA-CONF-6640	DE83704164	MN -37	9:10570
9	*See* CEA-CONF-6644	DE83704165	MN -37	9:10571
CONF-830231-	(Europhysics study conference on electroweak effects at high energies, Erice, Italy, 1-10 Feb 1983)			
8	*See* LAL-83-13	DE84750308	MN -28	9:10562
CONF-830246-	(Annual meeting of the American Crystallographic Association, Columbia, MO, USA, 1 Feb 1983)			
1	*See* BNL-33744	DE84002867	MN -37	9:10627
CONF-830247-	(Workshop on transport analysis codes for tokamaks with strong auxiliary heating, Princeton, NJ, USA, 28 Feb 1983)			
1	*See* PPPL-2055	DE84003484	STD -20	9:11232
CONF-830305-	(SPE symposium on low permeability, Denver, CO, USA, 14-16 Mar 1983)			
	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11636: 327-332(Mar 1983)			9:9330
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11764: 445-448(Mar 1983)			9:9357

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	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11619: 175-180(Mar 1983)			9:9360
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11640: 351-362(Mar 1983)			9:9361
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11644: 377-386(Mar 1983)			9:9362
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11646: 393-398(Mar 1983)			9:9363
	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11600: 17-28(Mar 1983)			9:9375
	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11601: 29-40(Mar 1983)			9:9376
	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11606: 63-72(Mar 1983)			9:9377
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11649: 421-430(Mar 1983)			9:9378
	Soc. Pet. Eng. AIME, Pap., SPE/DOE11810: 461-468(Mar 1983)			9:9379
	Soc. Pet. Eng. AIME, Pap., SPE/DOE 11624: 213-218(Mar 1983)			9:9419
CONF-830311-	(Particle accelerator conference, Santa Fe, NM, USA, 21-23 Mar 1983)			
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 2578-2580(Aug 1983)			9:10407
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3393-3395(Aug 1983)			9:10484
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3633-3635(Aug 1983)			9:10485
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3487-3489(Aug 1983)			9:10486
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3396-3398(Aug 1983)			9:10487
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3206-3208(Aug 1983)			9:10500
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3648-3650(Aug 1983)			9:10501
	IEEE Trans. Nucl. Sci., vp(Aug 1983)			9:10502
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3654-3656(Aug 1983)			9:10503
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 2237-2238(Aug 1983)			9:10518
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3198-3200(Aug 1983)			9:10528
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3218-3220(Aug 1983)			9:10529
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3226-3228(Aug 1983)			9:10530
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3414-3416(Aug 1983)			9:10531
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3244-3246(Aug 1983)			9:10532
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3212-3214(Aug 1983)			9:10533
	IEEE Trans. Nucl. Sci., NS-30: No. 4, 3481-3483(Aug 1983)			9:10564
194	*See* LAL-RT-83-07	DE84750307	MN -28	9:10563
195	*See* CEA-CONF-6766	DE84750331	MN -28	9:10478
196	*See* CEA-CONF-6765	DE84750332	MN -28	9:10477
CONF-830377-	(18. Rencontre de Moriond conference, La Plagne, France, 19-25 Mar 1983)			
4	*See* CEA-CONF-6683	DE84750267	MN -34B	9:10975
5	*See* CEA-CONF-6684	DE84750300	MN -34D	9:11068
CONF-830384-	(International symposium on nuclear physics at large tandem accelerators, Legnaro-Padova, Italy, 15-17 Mar 1983)			
3	*See* CEA-CONF-6682	DE84750305	MN -34C	9:11128
CONF-830390-	(US/Japanese seminar on physics of highly ionized ions produced in heavy ion collisions, Honolulu, HI, USA, 14-18 Mar 1983)			
3	*See* BNL-33473	DE84002851	MN -34A	9:10989
CONF-8303114-	(European Science Foundation workshop on dynamics of forest ecosystems, Uppsala, Sweden, 21-25 Mar 1983)			
1	NTIS, PC A03/MF A01	DE84003409	MN -11	9:10703
CONF-830418-	(International conference on dimensional stability and mechanical behavior of irradiated metals and alloys, Brighton, UK, 11-14 Apr 1983)			
10	*See* CEA-CONF-6685	DE84750266	MN -25	9:10208
11	*See* CEA-CONF-6691	DE84750276	MN -79	9:10209
12	*See* CEA-CONF-6724	DE84750279	MN -80	9:9813
CONF-830423-	(5. symposium on safeguards and nuclear material management, Versailles, France, 19-21 Apr 1983)			
15	*See* CEA-CONF-6699	DE84750275	MN -37	9:10309
CONF-830427-	(1. international symposium on molten salt chemical and technical, Kyoto, Japan, 20-22 Apr 1983)			
3	*See* CEA-CONF-6697	DE84750290	MN -76	9:9788
4	*See* CEA-CONF-6698	DE84750291	MN -76	9:9789
CONF-830430-	(14. symposiumm on nondestructive evaluation, San Antonio, TX, USA, 19-21 Apr 1983)			
3	NTIS, PC A02/MF A01	DE84004689	MN -94	9:9945
CONF-830444-	(International school-seminar on heavy ion physics, Alushta, USSR, 14-21 Apr 1983)			
5	*See* CEA-CONF-6700	DE84750304	MN -34C	9:11141
CONF-830451-	(American Ceramic Society annual meeting, Chicago, IL, USA, 25-28 Apr 1983)			
28	*See* CEA-CONF-6768	DE84750328	MN -70	9:9459
CONF-830469-	(Nuclear physics with heavy ions conference, Stony Brook, NY, USA, 14-16 Apr 1983)			
10	*See* CEA-CONF-6690	DE84750303	MN -34C	9:11140
CONF-830471-	(Saturne study meeting, Maine-et-Loire, France, 25-29 Apr 1983)			
2	*See* CEA-CONF-6720	DE84750301	MN -34C	9:11122
3	*See* CEA-CONF-6721	DE84750302	MN -34C	9:11137

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CONF-8304126-	(Calorimeter calibration workshop, Batavia, IL, USA, 29-30 Apr 1983)			
2	*See* BNL-34025	DE84005314	MN -38	9:10569
CONF-8304133-	(SSPS Central Receiver System (CRS) midterm workshop, Tabernas, Spain, 19-20 Apr 1983)			
	NTIS MF A01; 2	DE84001819	MN -62	9:9682
CONF-8304141-	(ASME international conference on advances in life prediction methods, Albany, NY, USA, 18-20 Apr 1983)			
1	*See* CEA-CONF-6692	DE84750265	MN -80	9:10210
CONF-8304143-	(7. annual conference on contemporary American Indian issues, Los Angeles, CA, USA, 15-16 Apr 1983)			
1	NTIS, PC A02/MF A01; 1	DE84003681	MN -11	9:10758
CONF-830528-	(7. international symposium on packaging and transportation of radioactive materials, New Orleans, LA, USA, 15-20 May 1983)			
63	*See* CEA-CONF-6779	DE84750287	MN -71	9:10399
64	*See* CEA-CONF-6776	DE84750289	MN -71	9:9448
65	*See* CEA-CONF-6778	DE84750318	MN -11	9:10398
66	*See* CEA-CONF-6780	DE84750319	MN -71	9:9449
67	*See* CEA-CONF-6794	DE84750326	MN -71	9:9450
CONF-830534-	(5. international symposium on passivity, Bombannes, France, 30 May-3 Jun 1983)			
2	*See* CEA-CONF-6796	DE84750281	MN -25	9:10218
CONF-830562-	(Specialist meeting on defect detection and sizing, Ispra, Italy, 3 May 1983)			
3	*See* CEA-CONF-6772	DE84750322	MN -25	9:10436
CONF-830570-	(6. international conference on ion beam analysis, Temple, AZ, USA, 22-27 May 1983)			
7	*See* CEA-CONF-6789	DE84750292	MN -4	9:10310
CONF-830580-	(PHOTON '83 - international conference on exhibition on optical fibers and their applicances, Paris, France, 16-19 May 1983)			
3	*See* CEA-CONF-6725	DE84750271	MN -25	9:10290
4	*See* CEA-CONF-6727	DE84750272	MN -25	9:10291
CONF-830582-	(Structural dynamics meeting, Ispra, Italy, 16-20 May 1983)			
5	*See* CEA-CONF-6782	DE84750325	MN -80	9:9834
CONF-830588-	(Delta-Nucleus dynamics symposium, Argonne, IL, USA, 2-4 May 1983)			
5	*See* CEA-CONF-6769	DE84750330	MN -34C	9:11117
CONF-8305110-	(Fronts, interfaces and patterns conference, Los Alamos, NM, USA, 2-6 May 1983)			
6	*See* LA-UR-83-2113	DE83015249	MN -34	9:11046
CONF-8305152-	(5. international congress on non-destructive control methods, Bordeaux, France, 30 May-3 Jun 1983)			
1	*See* CEA-CONF-6797	DE84750263	MN -78	9:9784
2	*See* CEA-CONF-6799	DE84750264	MN -79	9:9818
3	*See* CEA-CONF-6672	DE84750269	MN -25	9:10434
4	*See* CEA-CONF-6673	DE84750270	MN -37	9:9842
5	*See* CEA-CONF-6800	DE84750278	MN -25	9:10438
6	*See* CEA-CONF-6801	DE84750280	MN -80	9:9835
7	*See* CEA-CONF-6798	DE84750285	MN -25	9:10437
CONF-8305153-	(Colloquium on spin glasses, Heidelberg, F.R. Germany, 30 May-3 Jun 1983)			
1	*See* CEA-CONF-6795	DE84750268	MN -34	9:11159
CONF-8305155-	(4. specialists' meeting on water reactor fuel safety in off-normal and accident conditions, Risoe, Denmark, 16-20 May 1983)			
1	*See* CEA-CONF-6783	DE84750324	MN -78	9:9877
CONF-8305156-	(16. informal meeting on reactor noise, Budapest, Hungary, 18-20 May 1983)			
1	*See* CEA-CONF-6785	DE84750327	MN -78	9:9783
CONF-830607-	(American Society of Mechanical Engineers pressure vessel and piping conference, Portland, OR, USA, 19-24 Jun 1983)			
	Am. Soc. Mech. Eng., Pressure Vessels Piping Div., [Tech. Rep.] PVP, PVP-VOL. 71: 217-230(1983)			9:9778
	Am. Soc. Mech. Eng., Pressure Vessels Piping Div., [Tech. Rep.] PVP, PVP-VOL. 74: 179-186(1983)			9:9820
	Am. Soc. Mech. Eng., Pressure Vessels Piping Div., [Tech. Rep.] PVP, PVP-VOL 73: 133-150(1983)			9:9917
	Am. Soc. Mech. Eng., Pressure Vessels Piping Div., [Tech. Rep.] PVP, PVP-VOL. 73: 179-188(1983)			9:9918
	Am. Soc. Mech. Eng., [Pap.], 83-PUP-48: 7(1983)			9:9919
CONF-830609-	(ANS annual meeting, Detroit, MI, USA, 12-17 Jun 1983)			
	Trans. Am. Nucl. Soc., 44: 196-197(Jun 1983)			9:10338
	Trans. Am. Nucl. Soc., 44: 568-569(Jun 1983)			9:10534
	Trans. Am. Nucl. Soc., 44: 191(Jun 1983)			9:11115
	Trans. Am. Nucl. Soc., 44: 128-130(Jun 1983)			9:11343
	Trans. Am. Nucl. Soc., 44: 139-140(Jun 1983)			9:11344
	Trans. Am. Nucl. Soc., 44: 147-149(Jun 1983)			9:11345
	Trans. Am. Nucl. Soc., 44: 149-151(Jun 1983)			9:11346
	Trans. Am. Nucl. Soc., 44: 186-188(Jun 1983)			9:11347
CONF-830631-	(6. biennial wind energy conference, Minneapolis, MN, USA, 1-3 Jun 1983)			
14	*See* DOE/NASA/20305-9	DE84004216	STD -60	9:9748

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CONF-830659-	(TMS/AIME topical conference on ferritic alloys for use in nuclear energy technologies, Snowbird, UT, USA, 19-23 Jun 1983)			
20	*See* CEA-CONF-6749	DE84750274	MN -25	9:10216
21	*See* CEA-CONF-6743	DE84750277	MN -79	9:9817
CONF-830660-	(23. annual international conference of Canadian Nuclear Association, Montreal, Canada, 12-15 Jun 1983)			
4	*See* BNL-33926	DE84004291	MN -28	9:9812
CONF-830664-	(International gas research conference, London, UK, 13-16 Jun 1983)			
	Government Institutes, Inc., 966 Hungerford Drive, No. 24, Rockville, MD 20850		ND -92	9:9385
CONF-8306121-	(4. workshop on free-electron laser devices, Eastsound, WA, USA, 27 Jun-1 Jul 1983)			
4-Rev.1	*See* UCRL-89214-Rev.1	DE84004077	MN -28	9:10496
CONF-8306146-	(26. colloquium on metallurgy, Saclay, France, 20-22 Jun 1983)			
1	*See* CEA-CONF-6748	DE84750262	MN -25	9:10215
2	*See* CEA-CONF-6745	DE84750273	MN -25	9:10212
3	*See* CEA-CONF-6746	DE84750282	MN -25	9:10213
4	*See* CEA-CONF-6744	DE84750283	MN -25	9:10211
5	*See* CEA-CONF-6747	DE84750284	MN -25	9:10214
6	*See* CEA-CONF-6761	DE84750329	MN -70	9:9458
CONF-8306147-	(Seminar on nuclear fuels, Moscow, USSR, 20-22 Jun 1983)			
1	*See* CEA-CONF-6762	DE84750286	MN -78	9:10217
2	*See* CEA-CONF-6763	DE84750288	MN -80	9:9844
CONF-8306148-	(23. colloquium SPECTROSCOPICUM, Amsterdam, Netherlands, 26 Jun-1 Jul 1983)			
1	*See* CEA-CONF-6753	DE84750293	MN -25	9:10435
CONF-8306149-	(French-Soviet seminar on PWR steam-generators, Moscow, USSR, 27 Jun-5 Jul 1983)			
1	*See* CEA-CONF-6751	DE84750320	MN -78	9:9782
2	*See* CEA-CONF-6750	DE84750321	MN -78	9:9781
CONF-8306160-	(American Fisheries Society symposium on reservoir fisheries management, Lexington, KY, USA, 14-16 Jun 1983)			
1	NTIS, PC A02/MF A01	DE84003199	MN -11	9:10736
CONF-8306161-	(9. international congress on metallic corrosion, Totonto, Canada, 3-7 Jun 1983)			
1	*See* UCRL-90093	DE84004080	MN -4	9:10247
CONF-8306162-	(Conference on electric utility load forecasting, Annapolis, MD, USA, 8 Jun 1983)			
1	NTIS, PC A02/MF A01	DE84003200	MN -98E	9:10033
CONF-8306163-	(NATO advanced study institute on modulated structure materials, Crete, Greece, 15-25 Jun 1983)			
1	*See* LBL-16551	DE84001976	MN -25	9:11161
CONF-8306165-	(International conference on phase transformations in solids, Crete, Greece, 27 Jun-1 Jul 1983)			
1	*See* LBL-16550	DE84003050	MN -25	9:10239
CONF-830770-	(NATO advanced research workshop on positron scattering in gases, London, UK, 19-23 Jul 1983)			
1-Rev.1	*See* UCRL-89212-Rev.1	DE84004760	MN -34A	9:9530
CONF-830795-	(Symposium on energy removal and particle control and toroidal fusion devices, Princeton, NJ, USA, 26-29 Jul 1983)			
7	*See* PPPL-2046	DE84004296	STD -20c	9:11230
8	NTIS, PC A02/MF A01	DE84004446	MN -20	9:11264
CONF-8307109-	(11. SLAC summer institute conference on particle physics - dynamics and spectroscopy at high energy, Stanford, CA, USA, 18-29 Jul 1983)			
1	*See* SLAC-PUB-3245	DE84003858	MN -34D	9:11059
2	*See* ANL-HEP-CP-83-50	DE84003630	MN -28	9:11051
3	*See* LBL-16736	DE84002901	MN -34D	9:11057
4	*See* SLAC-PUB-3262	DE84005326	MN -34D	9:11061
CONF-8307110-	(Laboratory and observational infrared spectra of interstellar dust conference, Hilo, HI, USA, 18-21 Jul 1983)			
1	*See* LA-UR-83-3621	DE84004316	MN -34B	9:10978
CONF-8307111-	(American Mathematical Society summer workshop, Berkeley, CA, USA, 11-29 Jul 1983)			
1	*See* LA-UR-83-3545	DE84004227	MN -32	9:11181
CONF-8307112-	(American Mathematical Society research conference on fluids and plasmas: geometry and dynamics, Boulder, CO, USA, 17 Jul 1983)			
1	*See* LA-UR-83-3523	DE84004332	MN -32	9:11047
CONF-8307113-	(8. world conference on earthquake engineering, San Francisco, CA, USA, 21-28 Jul 1983)			
1	*See* UCRL-89986	DE84003246	MN -13	9:10406
CONF-830812-	(18. intersociety energy conversion engineering conference, Orlando, FL, USA, 21-26 Aug 1983)			
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 523-526(Aug 1983)			9:9332
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 512-517(Aug 1983)			9:9418
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2254-2259(Aug 1983)			9:9495
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2099-2104(Aug 1983)			9:9540

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	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1874-1879(Aug 1983)			9:9871
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1714-1720(Aug 1983)			9:9944
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1796-1800(Aug 1983)			9:9947
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1721-1727(Aug 1983)			9:9950
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1574-1581(Aug 1983)			9:9956
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1628-1634(Aug 1983)			9:9957
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1703-1707(Aug 1983)			9:9958
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1595-1598(Aug 1983)			9:9959
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1635-1640(Aug 1983)			9:9960
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1653-1657(Aug 1983)			9:9961
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1658-1664(Aug 1983)			9:9962
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1680-1684(Aug 1983)			9:9963
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1690-1695(Aug 1983)			9:9964
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1696-1702(Aug 1983)			9:9965
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2176-2178(Aug 1983)			9:9995
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2164-2166(Aug 1983)			9:10030
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1619-1623(Aug 1983)			9:10049
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1607-1612(Aug 1983)			9:10050
	Proc., Intersoc. Energy Convers. Eng. Conf., 3: 1425-1430(Aug 1983)			9:10051
	Proc., Intersoc. Energy Convers. Eng. Conf., 3: 1435-1440(Aug 1983)			9:10052
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2010-2014(Aug 1983)			9:10083
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1911-1914(Aug 1983)			9:10084
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2050-2058(Aug 1983)			9:10085
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1825-1831(Aug 1983)			9:10086
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2078-2084(Aug 1983)			9:10151
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2085-2091(Aug 1983)			9:10152
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2092-2098(Aug 1983)			9:10153
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1921-1926(Aug 1983)			9:10154
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 536-542(Aug 1983)			9:10178
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 600-608(Aug 1983)			9:10179
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 642-647(Aug 1983)			9:10180
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 708-713(Aug 1983)			9:10184
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 779-784(Aug 1983)			9:10185
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 856-862(Aug 1983)			9:10186
	Proc., Intersoc. Energy Convers. Eng. Conf., 2: 914-917(Aug 1983)			9:10187
	Proc., Intersoc. Energy Convers. Eng. Conf., 5: 2196-2202(Aug 1983)			9:10188
	Proc., Intersoc. Energy Convers. Eng. Conf., 3: 1405-1411(Aug 1983)			9:10191
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1806-1811(Aug 1983)			9:10409
	Proc., Intersoc. Energy Convers. Eng. Conf., 4: 1915-1920(Aug 1983)			9:10410
CONF-830822-	(12. international conference on high energy accelerators, Batavia, IL, USA, 11-16 Aug 1983)			
48	*See* LBL-16926	DE84004240	MN -28	9:10610
49	*See* LBL-16008	DE84004310	MN -34D	9:10494
CONF-830870-	(International geoscience and remote sensing symposium, San Francisco, CA, USA, 31 Aug-2 Sep 1983)			
2	*See* UCRL-89190	DE84004794	MN -11	9:10963

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CONF-830874-	(27. annual international technical symposium on high speed photography, videography and photonics, San Diego, CA, USA, 21-26 Aug 1983)			
32	NTIS, PC A02/MF A01	DE84003403	MN -37	9:10574
CONF-830889-	(NATO Advanced Study Institute on statistical extremes and applications, Vimeiro, Portugal, 31 Aug-14 Sep 1983)			
1-Rev.1	*See* UCRL-86245-Rev.1	DE84004408	MN -80	9:9916
CONF-8308101-	(International symposium on lepton and photon interactions at high energies, Ithaca, NY, USA, 4-9 Sep 1983)			
8	*See* BNL-33970	DE84004290	MN -34D	9:11067
CONF-8308131-	(3. international conference on physics in collision, Como, Italy, 31 Aug-2 Sep 1983)			
4	*See* BNL-33928	DE84004180	MN -34D	9:11065
CONF-8308144-	(Lectures in physics, Les Houches, France, 1 Aug 1983)			
1	*See* LBL-16747	DE84004637	MN -34	9:11087
CONF-8308145-	(Workshop on search for heavy flavors, Como, Italy, 29-30 Aug 1983)			
1	*See* SLAC-PUB-3247	DE84003862	MN -34D	9:11060
CONF-8308146-	(6. international summer institute conference in surface science (ISISS 1983), Milwaukee, WI, USA, 22 Sep 1983)			
1	*See* LBL-16573	DE84004634	MN -25	9:10240
CONF-8308147-	(Fine Particle Society meeting, Honolulu, HI, USA, 1-5 Aug 1983)			
1	Institute of Gas Technology, 3424 South State St., ITT Center, Chicago, IL 60616		MN -38	9:10459
CONF-8308148-	(International Astronomical Union symposium, College Park, MD, USA, 8-11 Aug 1983)			
1	*See* LA-UR-83-2515	DE84001389	MN -34B	9:10985
CONF-8308150-	(Annual meeting of the Society for Risk Analysis, New York, NY, USA, 1-3 Aug 1983)			
1	NTIS, PC A02/MF A01	DE84003407	MN -86	9:9445
CONF-8308153-	(7. international conference on mathemitical physics, Boulder, CO, USA, 1-11 Aug 1983)			
1	*See* LA-UR-83-2295	DE83017308	MN -34D	9:11175
CONF-8308154-	(31. national technician symposium, Denver, CO, USA, 28 Aug-2 Sep 1983)			
1	*See* MLM-3093(OP)	DE83016627	MN -4	9:10335
CONF-830901-	(Anticipated and abnormal plant transients in light water reactors conference, Jackson, WY, USA, 26-29 Sep 1983)			
22	*See* BNL-NUREG-33897	DE84004287	MN -78	9:9780
CONF-830910-	(3. national conference on synchrotron radiation instrumentation, Upton, NY, USA, 12-14 Sep 1983)			
10	*See* BNL-33969	DE84005095	MN -28	9:10504
CONF-830911-	(5. international conference on high power particle beams, San Francisco, CA, USA, 12-14 Sep 1983)			
35-Rev.1	*See* UCRL-89471-Rev.1	DE84004191	MN -34A	9:10497
CONF-830920-	(7. symposium on sources and ion assisted technology and 4. international conference on ion and plasma assisted techniques, Kyoto, Japan, 12-16 Sep 1983)			
11	*See* UCRL-89433	DE84004793	MN -20a	9:11335
CONF-830942-	(3. topical meeting on fusion reactor materials, Albuquerque, NM, USA, 19-23 Sep 1983)			
73	*See* HEDL-SA-2905	DE84004824	MN -20c	9:10231
74	*See* HEDL-SA-3007-FP	DE84004822	MN -20c	9:10232
78	NTIS, PC A02/MF A01	DE84004377	MN -20	9:11265
CONF-8309118-	(Topical meeting on free electron generation of extreme ultraviolet coherent radiation, Upton, NY, USA, 19-22 Sep 1983)			
6	*See* BNL-33986	DE84004735	MN -34A	9:10422
7	*See* BNL-34069	DE84005361	MN -34A	9:9528
CONF-8309163-	(Conference on low energy tests of conservation laws in particle physics, Blacksburg, VA, USA, 12-14 Sep 1983)			
4	*See* PNL-SA-11804	DE84004837	MN -37	9:10613
CONF-8309181-	(SUBWOG-6N meeting, London, UK, 14-16 Sep 1983)			
2	*See* SAND-83-1973C	DE84000450	MN -80	9:9868
CONF-8309187-	(CSNI leak-before-break conference, Monterey, CA, USA, 1-2 Sep 1983)			
1	NTIS, PC A02/MF A01	DE84004036	MN -80	9:9883
CONF-8309189-	(11. international congress on occupational health in the chemical industry, Galgary, Canada, 26-29 Sep 1983)			
1	*See* LA-UR-83-3583	DE84004319	MN -48	9:10926
CONF-8309191-	(NATO Advanced Study Institute: chemometric, Cosenza, Italy, 1 Sep 1983)			
1	*See* UCRL-90099	DE84004075	MN -4	9:10308
CONF-8309192-	(IUTAM 83 symposium: seabed mechanics, London, UK, 5 Sep 1983)			
1	*See* SAND-83-7455C	DE84003140	MN -70	9:10970
CONF-8309193-	(International conference on the dynamics of interfaces, Lille, France, 12-16 Sep 1983)			
1	*See* DOE/ER/45025-1	DE84002771	MN -34	9:10224
2	NTIS, PC A02/MF A01	DE84003716	MN -25	9:10220
CONF-8309195-	(International symposium on the behavior of long-lived radionuclides, LaSpezia, Italy, 28-30 Sep 1983)			
1	NTIS, PC A03/MF A01	DE84003448	MN -11	9:10749

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CONF-8309196-	(Meeting of the Division of Particles and Fields, Blacksburg, VA, USA, 15-17 Sep 1983)			
1	*See* BNL-33952	DE84004293	MN -34D	9:11066
CONF-8309197-	(DECUS symposium, Las Vegas, NV, USA, 29 Sep-23 Oct 1983)			
1	*See* SAND-83-2072C	DE83018234	MN -32	9:11390
CONF-831011-	(American Vacuum Society symposium, Boston, MA, USA, 31 Oct-4 Nov 1983)			
3-Rev.1	*See* UCRL-89299-Rev.1	DE84004812	MN -38	9:10445
CONF-831015-	(Nuclear science symposium, San Francisco, CA, USA, 19-21 Oct 1983)			
30	*See* LBL-16799	DE84004658	MN -34C	9:10609
31	*See* PNL-SA-11338	DE84004830	MN -37	9:10612
32	*See* LBL-15958	DE84004311	MN -38	9:10608
CONF-831016-	(Symposium on solar energy, Palma de Mallorca, Spain, 2-6 Oct 1983)			
2	NTIS, PC A02/MF A01; 1	DE84001949	MN -59c	9:9696
CONF-831047-	(American Nuclear Society winter meeting, San Francisco, CA, USA, 30 Oct-4 Nov 1983)			
91	NTIS, PC A02/MF A01	DE84001980	MN -79p	9:9882
CONF-831063-	(American Institute of Chemical Engineers fall annual meeting, Washington, DC, USA, 30 Oct-3 Nov 1983)			
12	*See* TVA/PUB-84/15	DE84900622	MN -95f	9:10150
CONF-831086-	(Electrochemical Society fall meeting, Washington, DC, USA, 9-14 Oct 1983)			
10	*See* BNL-33981	DE84004175	MN -25	9:10206
CONF-8310143-	(11. NRC water reactor safety research information meeting, Gaithersburg, MD, USA, 14-24 Oct 1983)			
49	*See* SAND-83-1910C	DE84003210	MN -78	9:9914
52	*See* PNL-SA-11617	DE84003351	MN -78	9:9912
73	*See* BNL-NUREG-33988	DE84004189	MN -78	9:9873
CONF-8310160-	(3. DOE workshop on computer-aided engineering, Livermore, CA, USA, 13-14 Oct 1983)			
1	*See* LBL-16805	DE84005176	MN -32	9:11385
CONF-8310167-	(NATO-AGARD lecture series number 131, Ankara, Turkey, 19-28 Oct 1983)			
2	*See* UCRL-89507	DE84000178	MN -38	9:10456
3	*See* UCRL-89838	DE84004785	MN -38	9:10457
CONF-8310172-	(Advances in soft x-ray science and technology conference, Upton, NY, USA, 17-20 Oct 1983)			
10	*See* BNL-34014	DE84004289	MN -28	9:10628
CONF-8310176-	(International meeting on reduced enrichment for research and test reactors, Tokai, Japan, 24-31 Oct 1983)			
8	*See* DP-MS-83-80	DE84000959	MN -80	9:9864
CONF-8310182-	(US fall DECUS symposium, Las Vegas, NV, USA, 24-28 Oct 1983)			
6	*See* LA-UR-83-3397	DE84003826	MN -32	9:11383
7	*See* LA-UR-83-3396	DE84003828	MN -32	9:11382
8	*See* LA-UR-83-3395	DE84003840	MN -32	9:11396
CONF-8310194-	(Asilomar conference on circuits, systems and computers, Pacific Grove, CA, USA, 31 Oct-2 Nov 1983)			
3	*See* LBL-16194	DE84004654	MN -32	9:11384
CONF-8310211-	(USE conference, Orlando, FL, USA, 4 Oct 1983)			
2	*See* SAND-83-1376C	DE84000052	MN -32	9:11388
3	*See* SAND-83-1874C	DE83017160	MN -32	9:11389
CONF-8310217-	(WANTO meeting, Miamisburg, OH, USA, 10-14 Oct 1983)			
2	*See* LA-UR-83-3477	DE84004327	MN -32	9:10631
CONF-8310223-	(Society of Automotive Engineers meeting, San Francisco, CA, USA, 31 Oct-1 Nov 1983)			
1	*See* LBL-16622	DE84002908	MN -96	9:10197
CONF-8310224-	(MPA seminar on safety of light water reactor pressure vessels, Stuttgart, F.R. Germany, 13-14 Oct 1983)			
1	*See* PNL-SA-11636	DE84004849	MN -78	9:9839
CONF-8310225-	(5. GAMM conference on numerical methods in fluid mechanics, Rome, Italy, 5-7 Oct 1983)			
1	*See* LBL-16828	DE84004959	MN -4	9:10391
CONF-8310227-	(Monopole '83 conference, Ann Arbor, MI, USA, 6-9 Oct 1983)			
1	*See* ANL-HEP-CP-83-61	DE84004005	MN -34D	9:11090
CONF-8310229-	(Chapman conference on magnetic reconnection, Los Alamos, NM, USA, 3-7 Oct 1983)			
3	*See* LA-UR-83-2691	DE84004330	MN -20g	9:11316
4	*See* UCRL-90109	DE84004157	MN -20	9:11341
7	*See* LA-UR-83-3239	DE84003777	MN -34B	9:10986
CONF-8310230-	(Environmental health aspects of estuarine research symposium, Virginia Beach, VA, USA, 22-26 Oct 1983)			
1	*See* UCRL-88687	DE84004361	MN -11	9:10935
CONF-8310231-	(International conference on hematopoietic cellular proliferation, Upton, NY, USA, 6-7 Oct 1983)			
1	*See* BNL-33919	DE84004307	MN -48	9:10829
2	*See* BNL-33857	DE84002862	MN -48	9:10783
CONF-8310232-	(NRC-NNWSI waste package workshop, Dublin, CA, USA, 18-19 Oct 1983)			
1	*See* HEDL-SA-3016FP	DE84004867	MN -70	9:9478

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CONF-8310233-	(New York State Birth Defects Institute symposium, Albany, NY, USA, 4 Oct 1983)			
1	*See* PNL-SA-11639	DE84001911	MN -48	9:10828
CONF-8310234-	(Magnetic spectrometer workshop, Williamsburg, VA, USA, 9-12 Oct 1983)			
1	NTIS, PC A02/MF A01	DE84003671	MN -37	9:10575
CONF-8310235-	(IAEA specialists' meeting on pellet-cladding interaction in water reactor fuel, Seattle, WA, USA, 3-5 Oct 1983)			
1	NTIS, PC A03/MF A01	DE84003650	MN -78	9:9845
2	*See* PNL-SA-11681	DE84003355	MN -78	9:9850
CONF-8310237-	(13. annual Illinois Economics Association, Chicago, IL, USA, 28-29 Oct 1983)			
1	NTIS, PC A02/MF A01	DE84003714	MN -11	9:9986
CONF-8310238-	(Illinois hazardous waste task force joint meeting of the committee on alternate technologies and economics committee, Rockford, IL, USA, 25 Oct 1983)			
1	NTIS, PC A02/MF A01; 1	DE84003605	MN -11	9:10134
2	NTIS, PC A02/MF A01	DE84003635	MN -69	9:9987
CONF-8310239-	(16. international Atlantic economic conference, Philadelphia, PA, USA, 6-9 Oct 1983)			
1	NTIS, PC A07/MF A01; 1	DE84003614	MN -13	9:9976
CONF-8310240-	(Symposium on air pollution and the productivity of the forest, Washington, DC, USA, 4-5 Oct 1983)			
1	NTIS, PC A02/MF A01; 1	DE84003323	MN -11	9:10918
3	NTIS, PC A02/MF A01	DE84003269	MN -11	9:10653
CONF-8310241-	(DOE/EPRI beta battery workshop, Washington, DC, USA, 18-20 Oct 1983)			
1	*See* LBL-16716	DE84002916	MN -94c	9:9955
CONF-8310242-	(2. international meeting of chemical carcinogenesis: xenobiotics and biotransformation, Alghero, Italy, 11-15 Oct 1983)			
1	NTIS, PC A02/MF A01	DE84003322	MN -48	9:10919
CONF-8310243-	(IEEE Professional Communication Society conference, Atlanta, GA, USA, 19-21 Oct 1983)			
1	NTIS, PC A02/MF A01; 1	DE84001981	MN -13	9:11359
CONF-8310244-	(Spatially-Oriented Referencing Systems Association (SORSA) general meeting, College Park, MD, USA, 10-14 Oct 1983)			
1	NTIS, PC A02/MF A01	DE84004456	MN -32	9:11368
CONF-8310245-	(Conference on Hadron substructure in nuclear physics, McCormick's Creek S.P., IN, USA, 19-21 Oct 1983)			
1	*See* LBL-16819	DE84005199	MN -34D	9:11081
CONF-831105-	(Meeting of the Plasma Physics Division of the American Physical Society, Los Angeles, CA, USA, 7-11 Nov 1983)			
5	*See* UCRL-89987	DE84004792	MN -20a	9:11338
6	*See* PPPL-2038	DE84000535	STD -20a	9:11326
CONF-831151-	(State-of-the-art and emerging technologies: a waste-to-energy workshop, Chicago, IL, USA, 28-30 Nov 1983)			
2	*See* EGG-M-22883	DE84005054	MN -95e	9:10171
CONF-831171-	(American Vacuum Society meeting, Boston, MA, USA, 1-4 Nov 1983)			
17	NTIS, PC A03/MF A01	DE84004684	MN -20a	9:11266
18	*See* UCRL-89726	DE84004814	MN -20f	9:11336
CONF-831174-	(Materials Research Society annual meeting, Boston, MA, USA, 14-17 Nov 1983)			
32	NTIS, PC A02/MF A01	DE84003257	MN -25	9:10265
56	*See* LBL-16732	DE84004651	MN -70	9:9482
58	*See* UCRL-89476	DE84004417	MN -70	9:10246
60	*See* BNL-34070	DE84005094	MN -25	9:10289
61	*See* DP-MS-83-71	DE84005197	MN -70B	9:9472
CONF-831180-	(3. international symposium on the production and neutralization of negative ions and beams, Upton, NY, USA, 14-18 Nov 1983)			
8	NTIS, PC A02/MF A01	DE84003301	MN -20f	9:11267
13	*See* LBL-16903	DE84004345	MN -20c	9:11323
14	*See* LBL-16939	DE84004241	MN -20g	9:11324
15	*See* LBL-16833	DE84004346	MN -20	9:11322
16	*See* BNL-34030	DE84004177	MN -28	9:10505
CONF-8311110-	(6. workshop on environmental research for actinide elements, Hilton Head Island, SC, USA, 7-11 Nov 1983)			
1	*See* PNL-SA-11773	DE84004843	MN -11	9:10968
CONF-8311111-	(2. inter-university energy symposium, Santiago, Chile, 14-19 Nov 1983)			
1	NTIS, PC A02/MF A01	DE84004039	MN -80	9:10004
2-Draft	NTIS, PC A02/MF A01; 1	DE84004682	MN -20	9:11280
3	NTIS, PC A02/MF A01; 1	DE84004683	MN -20	9:11281
CONF-8311112-	(Workshop on reactor based fundamental physics, Grenoble, France, 7-9 Nov 1983)			
1	NTIS, PC A02/MF A01	DE84004035	MN -34C	9:11052
2	*See* LA-UR-83-3250	DE84003781	MN -34C	9:11086
CONF-8311113-	(LAMPF users group report meeting, Argonne, IL, USA, 6-9 Nov 1983)			
1	NTIS, PC A02/MF A01; 1	DE84003995	MN -34D	9:11053
CONF-8311114-	(DOE robotics seminar (IMOG), St. Petersburg, FL, USA, 30 Nov 1983)			
1	*See* DP-MS-83-113	DE84003482	MN -2	9:10403

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CONF-8311115-	(Workshop on user interface management system, Frankfurt, F.R. Germany, 1 Nov 1983)			
1	*See* PNL-SA-11765	DE84003982	MN -32	9:11387
CONF-8311117-	(American Institute of Chemical Engineers meeting, Washington, DC, USA, 4 Nov 1983)			
1	*See* DP-MS-83-110	DE84002663	MN -70	9:9474
CONF-8311118-	(44. annual conference on glass problems, Urbana-Champaign, IL, USA, 15-16 Nov 1983)			
1	Institute of Gas Technology, 3424 South State St., IIT Center, Chicago, IL 60616		MN -11	9:9413
CONF-8311120-	(Workshop on stellar collapse, Toulouse, France, 7-11 Nov 1983)			
1	*See* BNL-33848	DE84002858	MN -34D	9:10974
CONF-8311121-	(Fall conference of theWater and Pollution Control Association of South Carolina, Myrtle Beach, SC, USA, 2 Nov 1983)			
1	*See* DP-MS-83-98	DE84003032	MN -11	9:10739
CONF-8311122-	(20. annual meeting of PNWIS-APCA, Seattle, WA, USA, 16-18 Nov 1983)			
1	*See* PNL-SA-11763	DE84003959	MN -41	9:10934
CONF-8311124-	(7. international symposium on the scientific basis for nuclear waste management, Boston, MA, USA, 14-17 Nov 1983)			
1	*See* LA-UR-83-3402	DE84003827	MN -70	9:9481
CONF-8311125-	(Mid-south conference on hazardous waste, Memphis, TN, USA, 7 Nov 1983)			
1	NTIS, PC A02/MF A01	DE84003282	MN -70	9:9469
CONF-8311126-	(International symposium on laboratory corrosion tests and standards, Bal Harbour, FL, USA, 14-17 Nov 1983)			
1	*See* BNL-NUREG-33806	DE84002871	MN -25	9:10207
CONF-8311129-	(EPRI seminar on applications of continuous coal analysis to the elelctric power utility industry, Nashville, TN, USA, 8-11 Nov 1983)			
1	*See* TVA/OP/EDT-84/8	DE84900620	MN -90a	9:9299
2	*See* TVA/OP/EDT-84/5	DE84900619	MN -90a	9:9264
CONF-8311130-	(International conference on fracture prevention in energy and transport systems, Rio de Janeiro, Brazil, 27 Nov-2 Dec 1983)			
1	*See* LBL-16681	DE84004314	MN -25	9:10241
CONF-8311131-	(Physics and technical applications of amorphous materials meeting, Tokyo, Japan, 15 Nov 1983)			
1	*See* SERI/TP-211-2125	DE84000023	STD -63e	9:9610
CONF-831203-	(10. symposium on fusion engineering, Philadelphia, PA, USA, 5-9 Dec 1983)			
39	NTIS, PC A02/MF A01; 1	DE84004013	MN -21	9:11268
43	*See* LA-UR-83-3476	DE84004328	MN -20f	9:11318
44	*See* LA-UR-83-3470	DE84004329	MN -21	9:11317
45	*See* LA-UR-83-3489	DE84004322	MN -20f	9:11319
46	*See* LA-UR-83-3490	DE84004321	MN -20f	9:11320
47	*See* LA-UR-83-3505	DE84004334	MN -20d	9:11321
48	*See* LA-UR-83-3480	DE84004326	MN -20f	9:11229
49	*See* EGG-M-10583	DE84004229	MN -20	9:11287
51	*See* UCRL-89285	DE84004079	MN -20a	9:11334
52	*See* HEDL-SA-2925-FP	DE84004825	MN -20	9:11294
53	*See* UCRL-90092	DE84004076	MN -20	9:11340
54	*See* UCRL-90059	DE84004359	MN -20	9:11339
56	NTIS, PC A02/MF A01; 1	DE84004583	MN -20b	9:11269
57	NTIS, PC A02/MF A01; 1	DE84004577	MN -20b	9:11270
58	NTIS, PC A02/MF A01; 1	DE84004681	MN -20a	9:11271
59	NTIS, PC A02/MF A01	DE84004783	MN -20b	9:11272
60-Draft	NTIS, PC A02/MF A01	DE84004420	MN -20a	9:11273
62	NTIS, PC A02/MF A01	DE84004440	MN -20b	9:11274
67	NTIS, PC A02/MF A01	DE84004588	MN -20b	9:11275
68	NTIS, PC A02/MF A01; 1	DE84004545	MN -20b	9:11276
69	NTIS, PC A02/MF A01	DE84004568	MN -20	9:11185
71	*See* UCRL-89759	DE84004190	MN -21	9:11337
72	NTIS, PC A03/MF A01	DE84004687	MN -21	9:11277
73-Draft	NTIS, PC A03/MF A01; 1	DE84004644	MN -20b	9:11278
74	*See* EGG-M-10683	DE84005055	MN -20	9:11288
83	*See* EGG-M-10483	DE84004541	MN -20	9:11188
84	*See* EGG-M-23583	DE84004540	MN -20	9:11289
91	NTIS, PC A02/MF A01; 1	DE84005217	MN -90i	9:9280
CONF-831205-	(6. Miami international conference on alternative energy sources, Miami Beach, FL, USA, 12-14 Dec 1983)			
5	NTIS, PC A02/MF A01	DE84004580	MN -61a	9:9535
CONF-831217-	(5. civilian radioactive waste management information meeting, Washington, DC, USA, 12-15 Dec 1983)			
8	NTIS, PC A02/MF A01	DE84005287	MN -70	9:9466
10	NTIS, PC A02/MF A01; 1	DE84005292	MN -70	9:9467
12	NTIS, PC A02/MF A01; 1	DE84005291	MN -70	9:9468
CONF-831235-	(22. IEEE conference on decision control, San Antonio, TX, USA, 14 Dec 1983)			
3	*See* EGG-M-05183	DE84005306	MN -37	9:10629
CONF-831239-	(Systems simulation symposium of fossil fuel conversion processes, Morgantown, WV, USA, 6-8 Dec 1983)			
3	NTIS, PC A02/MF A01	DE84005266	MN -90g	9:9761

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CONF-831244-	(2. conference on municipal, hazardous and coal wastes management, Miami Beach, FL, USA, 5-7 Dec 1983)			
1	NTIS, PC A02/MF A01	DE84004581	MN -90i	9:9281
CONF-831253-	(9. workshop on geothermal reservoir engineering, Stanford, CA, USA, 13-15 Dec 1983)			
2	*See* EGG-M-24883	DE84005099	MN -66a	9:9735
3	*See* EGG-M-23983	DE84005305	MN -66a	9:9734
CONF-831254-	(Agricultural electronics - 1983 and beyond conference, Chicago, IL, USA, 11-12 Dec 1983)			
1	*See* LA-UR-83-3481	DE84004323	MN -37	9:10771
CONF-831256-	(6. international conference on computing methods in applied sciences and engineering, Paris, France, 12-16 Dec 1983)			
1	*See* UCRL-90030	DE84003735	MN -38	9:11392
CONF-831257-	(IEEE meeting, Washington, DC, USA, 5-7 Dec 1983)			
1	NTIS, PC A02/MF A01	DE84004442	MN -20a	9:11279
CONF-831258-	(15. international congress of genetics, satellite symposium on mutagenesis: basic and applied, Darbhanga, India, 22-23 Dec 1983)			
1	NTIS, PC A02/MF A01	DE84004428	MN -48	9:10843
2	NTIS, PC A02/MF A01	DE84004576	MN -48	9:10764
3	NTIS, PC A02/MF A01	DE84004544	MN -48	9:10917
CONF-831259-	(US/Japan workshop on fusion reactor materials, Tsukuba, Japan, 5-7 Dec 1983)			
1	NTIS, PC A05/MF A01	DE84004458	MN -20c	9:10219
CONF-831261-	(International symposium on sister chromatic exchange, Upton, NY, USA, 4-8 Dec 1983)			
2	*See* UCRL-90106	DE84004820	MN -48	9:10773
CONF-840101-	(Winter conference on plasma spectrochemistry, San Diego, CA, USA, 2-6 Jan 1984)			
2	NTIS, PC A03/MF A01	DE84005267	MN -83	9:10311
CONF-840133-	(11. aerospace sciences meeting, Reno, NV, USA, 9-12 Jan 1984)			
4	*See* UCRL-89400	DE84004365	MN -25	9:10431
CONF-840136-	(6. annual discontinuously reinforced metal matrix composite coordination working group meeting, Park City, UT, USA, 4-6 Jan 1984)			
1	*See* LA-UR-83-3717	DE84004376	MN -4	9:10271
CONF-840137-	(3. conference on meteorology of the coastal zone, Miami Beach, FL, USA, 9-13 Jan 1984)			
1	*See* BNL-34029	DE84004178	MN -11	9:10639
CONF-840201-	(ASME energy sources technology conference and exhibition, New Orleans, LA, USA, 12-16 Feb 1984)			
7	NTIS, PC A02/MF A01; 1	DE84003612	MN -38	9:10424
CONF-840202-	(17. midyear topical meeting of the Health Physics Society, Pasco, WA, USA, 5-9 Feb 1984)			
11	*See* LA-UR-83-3520	DE84004331	MN -46	9:10638
CONF-840415-	(187. national meeting of the American Chemical Society, St. Louis, MO, USA, 8-13 Apr 1984)			
13	*See* BNL-33932	DE84005316	MN -91	9:9417
CONF-840475-	(Hazardous material spills conference, Nashville, TN, USA, 9-12 Apr 1984)			
2	*See* UCRL-89459	DE84004061	MN -11	9:10336
CONTRIB-				
238	*See* PB-83-255497			9:10707
COO-				
3117-26	*See* DOE/ER/03117-26	DE84005150	MN -4	9:10377
3117-27	*See* DOE/ER/03117-27	DE84005151	MN -4	9:10378
4938-5	*See* DOE/ER/04938-5	DE84005167	MN -38	9:10400
DOE/AL/12548-				
T1	NTIS, PC A03/MF A01	DE84003496	MN -59a	9:9697
DOE/AP/10036-				
T1	NTIS, PC A06/MF A01	DE84004093	MN -98E	9:10034
DOE/AP/10041-				
T1	NTIS, PC A13/MF A01	DE84004096	MN -97a	9:9766
T2	NTIS, PC A09/MF A01; 1	DE84004095	MN -97a	9:9767
DOE/BETC/QPR-				
83/ 2	NTIS, PC A04/MF A01; 1	DE84005014	STD -92a	9:9324
DOE/BETC/TPR-				
83/ 1	NTIS, PC A05/MF A01	DE84005117	STD -92a	9:9374
DOE/BP-				
188	NTIS, PC A02/MF A01; 1	DE84005010	MN -97c	9:10035
191	NTIS, PC A03/MF A01	DE84005331	MN -97	9:10036
DOE/CE/15087-				
T1	NTIS, PC A02/MF A01; 1	DE84005276	MN -92a	9:9325
DOE/CE/15102-				
T1-Pt.1	NTIS, PC A03/MF A01; 1	DE84001433	MN -97a	9:9768
T1-Pt.2	NTIS, PC A04/MF A01; 1	DE84003290	STD -97a	9:9769
DOE/CE/26407-				
T1	NTIS, PC A03/MF A01	DE84005158	MN -95d	9:10168
T2	NTIS, PC A99/MF A01; 1	DE84005157	MN -95d	9:10169
DOE/CE/30719-				
T1	NTIS, PC A14/MF A01; 1	DE84003866	MN -58	9:9581
DOE/CE/30742-				
15	NTIS, PC A03; 3	DE84005337	MN -59a	9:9698

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DOE/CH/03000-				
T10	NTIS, PC A06/MF A01; 1	DE84005164	MN -32	9:10506
T11	NTIS, PC A06/MF A01; 1	DE84005387	MN -2	9:10507
DOE/CH/10101-				
T3	NTIS, PC A03/MF A01; 1	DE84004548	MN -59a	9:9699
DOE/CH/10122-				
18	NTIS, PC A04/MF A01	DE84004482	MN -98	9:9999
19	NTIS, PC A09/MF A01; 1	DE84004466	MN -98D	9:9977
DOE/CS/10047-				
T8	NTIS, PC A05/MF A01	DE84002091	STD -98B	9:10025
DOE/CS/15003-				
T1	NTIS, PC A02/MF A01	DE84002125	MN -95f	9:10135
DOE/CS/15016-				
T1	NTIS, PC A03/MF A01; 1	DE84002132	MN -95f	9:10136
DOE/CS/20271-				
3	NTIS, PC A05/MF A01; 1	DE84005455	MN -95d	9:10062
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T2	NTIS, PC A02/MF A01	DE84004546	MN -95a	9:10173
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T4	NTIS, PC A05/MF A01; 1	DE84005159	MN -59	9:9700
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T1	NTIS, PC A03/MF A01	DE84004772	MN -95f	9:10139
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T1	NTIS, PC A02/MF A01	DE84002122	MN -96	9:10189
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T1(Exec.Summ.)	NTIS, PC A02/MF A01	DE84002120	MN -96	9:10129
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T1	NTIS, PC A02/MF A01	DE84004774	MN -95	9:10175
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T1	NTIS, PC A05/MF A01; 1	DE84004217	MN -95a	9:10176
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T1	NTIS, PC A02; 3	DE84005085	MN -95	9:10055
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T1	NTIS, PC A02/MF A01	DE84005341	MN -63e	9:9720
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T1	NTIS, PC A03/MF A01; 1	DE84005245	MN -60	9:9745
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T27	NTIS MF A01; 2	DE84004479	MN -62	9:9683
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1	NTIS, PC A07/MF A01; 1	DE84005181	MN -21	9:11282
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0228	NTIS, PC A04/MF A01; 1	DE84005333	MN -97b	9:10037
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T2	NTIS, PC A03; 3	DE84005204	MN -98B	9:9334
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T1	NTIS, PC A04/MF A01	DE84004942	MN -98G	9:9978
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T5	NTIS, PC A03/MF A01	DE84004729	MN -98	9:9337
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0040(83)	NTIS, PC A14/MF A01 - GPO	DE84004559	MN -98E	9:10038
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1404	NTIS, PC A13/MF A01; 1	DE84005153	MN -25	9:10198
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26	NTIS, PC A02/MF A01; 1	DE84005150	MN -4	9:10377
27	NTIS, PC A03/MF A01	DE84005151	MN -4	9:10378
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7	NTIS, PC A02/MF A01	DE84005321	MN -61c	9:9593
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5	NTIS, PC A02/MF A01	DE84005167	MN -38	9:10400
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DOE/ER/13012-2	NTIS, PC A02/MF A01	DE84005270	MN -34A	9:10991
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T10	NTIS, PC A02/MF A01	DE84004674	MN -20a	9:11286
DOE/ER/53122-2	NTIS, PC A02/MF A01; 1	DE84005152	MN -20f	9:11186
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DOE/ET/20261-T1	NTIS, PC A09/MF A01; 1	DE84005354	MN -60	9:9746
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DOE/ET/26210-T1	NTIS, PC A05/MF A01	DE84005398	MN -92b	9:9384
DOE/ET/28419-7	NTIS, PC A05/MF A01	DE84005320	MN -66g	9:9742
DOE/ET/29069-T2	NTIS, PC A06/MF A01	DE84004046	STD -97a	9:10449
DOE/ET/29127-1	NTIS MF A01; 2	DE84005503	MN -97	9:9757
DOE/ET/29191-T1	NTIS, PC A07/MF A01; 1	DE84004765	MN -38	9:10450
T2	NTIS, PC A07/MF A01; 1	DE84005283	MN -38	9:10451
DOE/ET/29365-2	NTIS, PC A08/MF A01; 1	DE84005504	MN -97	9:11371
4	NTIS, PC A06/MF A01; 1	DE84005506	MN -97	9:9758
DOE/ET/34014-11	NTIS (US Sales Only), PC A06/MF A01; 1	DE84004476	STD -78	9:10402
DOE/ET/34031-15	NTIS (US Sales Only), PC A04/MF A01; 1	DE84005424	STD -78	9:9773
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DOE/EV/00936-7	NTIS, PC A02/MF A01; 1	DE84004336	MN -11	9:10726
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DOE/EV/04267-T1	NTIS, PC A05/MF A01; 1	DE84005100	MN -48	9:10768
DOE/EV/06194-2-Rev.1	NTIS, PC A06/MF A01	DE84004295	STD -45	9:10636
DOE/EV/10340-1	NTIS, PC A02/MF A01	DE84005393	MN -11	9:10640
DOE/EV/10341-T1	NTIS, PC A04/MF A01; 1	DE84004748	MN -11	9:11395
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DOE/EV/70035-T2	NTIS, PC A02/MF A01	DE83016163	MN -69	9:10654
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DOE/FE/05113-T1	NTIS, PC A04/MF A01	DE84005282	MN -90	9:9289
DOE/FE/50037-T1	NTIS, PC A11/MF A01; 1	DE84002770	STD -90	9:9218
DOE/ID-10117	NTIS, PC A04/MF A01	DE84005012	STD -66a	9:9738
DOE/ID/12423-T1	NTIS, PC A04/MF A01	DE84005190	MN -95f	9:10140
DOE/IG-0008/ 5	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		STD -13	9:9967
0202	USDOE-TIC, PO Bx 62, Oak Ridge, TN 37830		STD -13	9:11360
DOE/JPL/954527-83/ 25	NTIS, PC A04/MF A01; 1	DE84005084	STD -63b	9:9596
DOE/JPL/956046-83-17	NTIS, PC A03/MF A01	DE84005466	STD -63b	9:9597
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DOE/MC/16140-6	NTIS, PC A05/MF A01; 1	DE84005118	STD -92a	9:9326
DOE/MC/19163-T11	NTIS, PC A15/MF A01; 1	DE84005069	MN -90c	9:9225
T12	NTIS, PC A19/MF A01; 1	DE84004472	MN -90c	9:9226
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50	NTIS, PC A03/MF A01	DE84005397	STD -25	9:10183
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4004262	NTIS, PC A02/MF A01	DE84004262	MN -95d	9:10064
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T41	NTIS, PC A02/MF A01	DE84005087	MN -97e	9:9567
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79-509	NTIS, PC AA03; 3	DE84003720	MN -97e	9:9870
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247	*See* CEA-CONF-6741	DE84750309	MN -79	9:9816
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249	*See* CEA-CONF-6739	DE84750315	MN -79	9:9853
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500	*See* CEA-CONF-6627	DE83704323	MN -41	9:9875
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128	NTIS (US Sales Only), PC A09/MF A01	DE83704561	MN -23	9:10576
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83-01	NTIS (US Sales Only), PC A08/MF A01; 1	DE83751373	MN -60	9:9751
EFI-				
493(36) -81	NTIS (US Sales Only), PC A02/MF A01	DE83704166	MN -37	9:10577
516(3) -82	NTIS (US Sales Only), PC A02/MF A01	DE83704167	MN -37	9:10578
519(6) -82	NTIS (US Sales Only), PC A02/MF A01	DE83704580	MN -37	9:10579
521(8) -82	NTIS (US Sales Only), PC A02/MF A01	DE83704472	MN -34B	9:10976
522(9) -82	NTIS (US Sales Only), PC A02/MF A01	DE83704597	MN -32	9:11054
574(61) -82	NTIS (US Sales Only), PC A02/MF A01	DE83704430	MN -34D	9:11164
EGG-				
10282-1021	NTIS, PC A02/MF A01; 1	DE84005015	STD -41	9:10684
10282-1024	NTIS, PC A02/MF A01; 1	DE84005018	STD -41	9:10685
10282-2026	NTIS, PC A03/MF A01	DE84005462	MN -37	9:10580
EGG-IS-				
6478	NTIS, PC A05/MF A01	DE84005191	MN -32	9:11374
EGG-M-				
05183	NTIS, PC A02/MF A01	DE84005306	MN -37	9:10629
10483	NTIS, PC A02/MF A01; 1	DE84004541	MN -20	9:11188
10583	NTIS, PC A02/MF A01	DE84004229	MN -20	9:11287
10683	NTIS, PC A02/MF A01	DE84005055	MN -20	9:11288
22883	NTIS, PC A02/MF A01	DE84005054	MN -95e	9:10171
23583	NTIS, PC A02/MF A01	DE84004540	MN -20	9:11289
23983	NTIS, PC A02/MF A01; 1	DE84005305	MN -66a	9:9734
24883	NTIS, PC A02/MF A01	DE84005099	MN -66a	9:9735
EGG-SAAM-				
6452	NTIS, PC A04/MF A01	DE84004941	MN -80	9:9885
EGG-TFBP-				
6279-Rev.1	NTIS, PC A04/MF A01	DE84005029	MN -78	9:9886
EIS-				
4900607	Minerals Management Service, 12203 Sunrise Valley Dr., Reston, VA 22091		MN -11	9:10757
ESG-				
83108	*See* DOE/CH/10122-18	DE84004482	MN -98	9:9999
EUR-				
7905-EN	*See* PB-83-254664			9:9774
8183-EN	*See* PB-83-248872			9:9785
8347-EN	Available from Commission of the European Communities, Luxembourg			9:9721
8361-EN	*See* PB-83-252866			9:9972
EUR-CEA-FC-				
1183	NTIS (US Sales Only), PC A02/MF A01	DE84750334	MN -20g	9:11189
1184	NTIS (US Sales Only), PC A04/MF A01	DE84750336	MN -20a	9:11290
1188	NTIS (US Sales Only), PC A04/MF A01; 1	DE84750337	MN -20f	9:11190
1190	NTIS (US Sales Only), PC A13/MF A01; 1	DE84750335	MN -20f	9:11191
FE-				
2013-26	*See* DOE/PC/40781-T9	DE84004751	MN -90d	9:9227
2893-119	*See* DOE/ET/10069-T79	DE84005208	STD -90d	9:9221
FEI-				
1270	NTIS (US Sales Only), PC A02/MF A01	DE83704539	MN -25	9:10269

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1271	NTIS (US Sales Only), PC A02/MF A01	DE83704114	MN -25	9:9865
1286	NTIS (US Sales Only), PC A02/MF A01	DE83704115	MN -25	9:10270
FERMILAB/TM-				
1225	NTIS, PC A02/MF A01	DE84004777	MN -28	9:10508
1228	NTIS, PC A03/MF A01	DE84005166	MN -28	9:10404
1231	NTIS, PC A02/MF A01	DE84005162	MN -28	9:10509
1232	NTIS, PC A02/MF A01; 1	DE84005163	MN -28	9:10492
1233	NTIS, PC A02/MF A01; 1	DE84005160	MN -37	9:10444
FOA-C-				
40161-W4	NTIS (US Sales Only), PC A04/MF A01	DE83704553	MN -41	9:10847
FR-				
2100-09-81-VOL-1	*See* PB-83-251934			9:10193
2100-09-81-VOL-2	*See* PB-83-251942			9:10194
FRNC-TH-				
1226	NTIS (US Sales Only), PC A07/MF A01; 1	DE84750338	MN -4	9:10384
1227	NTIS (US Sales Only), PC A07/MF A01; 1	DE84750339	MN -80	9:10225
1291	NTIS (US Sales Only), PC A13/MF A01; 1	DE84750333	MN -34B	9:10983
FWS/OBS-				
83/ 26	Minerals Management Service, Dept. of the Interior, Washington, DC 20240		MN -11	9:10727
G-				
80143	*See* AD-A-131933/4			9:10397
GA-A-				
16839	NTIS, PC A13/MF A01; 1	DE84005201	STD -85	9:9476
16844	NTIS, PC A05/MF A01; 1	DE84005323	STD -20	9:11291
17009	NTIS, PC A04/MF A01; 1	DE84005203	STD -85	9:9477
17010	NTIS, PC A02/MF A01	DE84004892	MN -20a	9:11292
GEAP-				
22274	*See* DOE/ET/34209-32	DE84004623	STD -78	9:9836
30268	*See* DOE/ET/34031-15	DE84005424	STD -78	9:9773
GEND-INF-				
037-Vol.5	NTIS, PC A09/MF A01; 1	DE84004467	MN -78	9:9887
GJ/TMC-				
10(83)	NTIS, PC A03/MF A01	DE84004375	STD -70A	9:10313
GJBX-				
33(83)	NTIS PC E09/MF $10.00; 1	DE84005048	MN -51	9:9443
GKSS-				
83/ E/ 16	Scr. Metall. v. 17 (1983) p. 203-208			9:10226
83/ E/ 18	Neutron Radiography, J.P. Barton, P. von der Hardt (eds.), (1983) p. 565-571			9:10794
83/ E/ 19	Neutron Radiography, J.P. Barton, P. von der Hardt (eds.) (1983) p. 573-580			9:10795
HEDL-				
7408	NTIS, PC A02/MF A01	DE84004940	MN -20c	9:11293
7420	NTIS, PC A02/MF A01	DE84004309	MN -20c	9:10227
7421	NTIS, PC A02/MF A01	DE84005381	MN -20c	9:10228
7424	NTIS, PC A02/MF A01; 1	DE84005382	MN -20c	9:10229
7425	NTIS, PC A02/MF A01	DE84004385	MN -20c	9:10230
HEDL-SA-				
2905	NTIS, PC A02/MF A01	DE84004824	MN -20c	9:10231
2925-FP	NTIS, PC A02/MF A01	DE84004825	MN -20	9:11294
3007-FP	NTIS, PC A02/MF A01; 1	DE84004822	MN -20c	9:10232
3016FP	NTIS, PC A02/MF A01; 1	DE84004867	MN -70	9:9478
HEDL-TME-				
83-21	*See* NUREG/CR-3391-Vol.1	DE84004657	MN -78	9:9838
IAE-				
3535/ 6	NTIS (US Sales Only), PC A03/MF A01	DE83704455	MN -20	9:11295
3549/ 10	NTIS (US Sales Only), PC A02/MF A01	DE83704184	MN -37	9:10293
IAEA-R-				
1726-F	NTIS (US Sales Only), PC A02/MF A01	DE83704532	MN -4	9:10314
1793-F	NTIS (US Sales Only), PC A02/MF A01	DE83704321	MN -48	9:10740
1929-F	NTIS (US Sales Only), PC A02/MF A01	DE83704549	MN -48	9:10848
2032-F	NTIS (US Sales Only), PC A02/MF A01	DE83704120	MN -48	9:10837
2259-F	NTIS (US Sales Only), PC A06/MF A01	DE83704541	MN -11	9:10953
2384/ F	NTIS (US Sales Only), PC A02/MF A01	DE83704542	MN -11	9:10954
2424/ F	NTIS (US Sales Only), PC A05/MF A01	DE83704543	MN -11	9:10642
2491-F	NTIS (US Sales Only), PC A06/MF A01	DE83704127	MN -41	9:9968
2612-F	NTIS (US Sales Only), PC A06/MF A01	DE83704128	MN -41	9:9969
2696-F	NTIS (US Sales Only), PC A02/MF A01	DE83704121	MN -48	9:10836
2704-F	NTIS (US Sales Only), PC A02/MF A01	DE83704550	MN -48	9:10741
IAEA-RL-				
97	NTIS (US Sales Only), PC A06/MF A01	DE83704122	MN -23	9:10769
98	NTIS (US Sales Only), PC A05/MF A01	DE83704123	MN -23	9:10770
IAEA-TECDOC-				
278	NTIS (US Sales Only), PC A03/MF A01	DE83704596	MN -2	9:9888
279	NTIS (US Sales Only), PC A04/MF A01	DE83704119	MN -48	9:10686
281	NTIS (US Sales Only), PC A04/MF A01	DE83704185	MN -37	9:10796
285	NTIS (US Sales Only), PC A03/MF A01	DE83704589	MN -70	9:9479
286	NTIS (US Sales Only), PC A04/MF A01	DE83704572	MN -80	9:9846
IAEA-WMRA-				
14	NTIS (US Sales Only), PC A13/MF A01	DE83704586	MN -70	9:9480
IC-				
80/ 1	NTIS (US Sales Only), PC A02/MF A01	DE83704476	MN -34D	9:11091
80/ 14	NTIS (US Sales Only), PC A02/MF A01	DE83704477	MN -34D	9:11092
80/ 47	NTIS (US Sales Only), PC A03/MF A01	DE83704478	MN -34D	9:11069

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81/ 64	NTIS (US Sales Only), PC A02/MF A01	DE83704432	MN -34D	9:11165
81/ 235	NTIS (US Sales Only), PC A02/MF A01	DE83704431	MN -34D	9:11375
82/ 14	NTIS (US Sales Only), PC A02/MF A01	DE83704434	MN -34D	9:11093
82/ 38	NTIS (US Sales Only), PC A02/MF A01	DE83704443	MN -34D	9:11376
82/ 50	NTIS (US Sales Only), PC A02/MF A01	DE83704444	MN -34D	9:11094
82/ 51	NTIS (US Sales Only), PC A02/MF A01	DE83704445	MN -34D	9:11377
82/ 52	NTIS (US Sales Only), PC A02/MF A01	DE83704446	MN -34D	9:11095
82/ 56	NTIS (US Sales Only), PC A02/MF A01	DE83704447	MN -34D	9:11096
82/ 57	NTIS (US Sales Only), PC A03/MF A01	DE83704448	MN -34D	9:11097
82/ 58	NTIS (US Sales Only), PC A02/MF A01	DE83704449	MN -34D	9:11098
82/ 66	NTIS (US Sales Only), PC A02/MF A01	DE83704598	MN -32	9:11378
82/ 67	NTIS (US Sales Only), PC A02/MF A01	DE83704599	MN -32	9:11379
82/ 80	NTIS (US Sales Only), PC A02/MF A01	DE83704490	MN -34D	9:11084
82/ 97	NTIS (US Sales Only), PC A02/MF A01	DE83704491	MN -34D	9:11099
82/ 98	NTIS (US Sales Only), PC A02/MF A01	DE83704492	MN -34D	9:11070
82/ 99	NTIS (US Sales Only), PC A03/MF A01	DE83704493	MN -34D	9:11085
82/ 101	NTIS (US Sales Only), PC A02/MF A01	DE83704479	MN -34D	9:11100
82/ 113	NTIS (US Sales Only), PC A02/MF A01	DE83704433	MN -34D	9:11101
82/ 140	NTIS (US Sales Only), PC A02/MF A01	DE83704435	MN -34D	9:11102
82/ 142	NTIS (US Sales Only), PC A02/MF A01	DE83704436	MN -34D	9:11103
82/ 161	NTIS (US Sales Only), PC A02/MF A01	DE83704480	MN -34D	9:11071
82/ 174	NTIS (US Sales Only), PC A02/MF A01	DE83704481	MN -34D	9:11072
82/ 175	NTIS (US Sales Only), PC A02/MF A01	DE83704482	MN -34D	9:11104
82/ 177	NTIS (US Sales Only), PC A02/MF A01	DE83704483	MN -34D	9:11105
82/ 180	NTIS (US Sales Only), PC A02/MF A01	DE83704484	MN -34D	9:11073
82/ 183	NTIS (US Sales Only), PC A02/MF A01	DE83704485	MN -34D	9:11074
82/ 191	NTIS (US Sales Only), PC A02/MF A01	DE83704486	MN -34D	9:11075
82/ 199	NTIS (US Sales Only), PC A02/MF A01	DE83704437	MN -34D	9:11106
82/ 209	NTIS (US Sales Only), PC A02/MF A01	DE83704488	MN -34D	9:11076
82/ 215	NTIS (US Sales Only), PC A02/MF A01	DE83704489	MN -34D	9:11055
82/ 217	NTIS (US Sales Only), PC A02/MF A01	DE83704438	MN -34D	9:11380
82/ 221	NTIS (US Sales Only), PC A03/MF A01	DE83704439	MN -34D	9:11166
82/ 225	NTIS (US Sales Only), PC A02/MF A01	DE83704440	MN -34D	9:11381
82/ 228	NTIS (US Sales Only), PC A02/MF A01	DE83704441	MN -34D	9:11167
82/ 233	NTIS (US Sales Only), PC A02/MF A01	DE83704442	MN -34D	9:11107
ICTIS/RES-				
04	NTIS (US Sales Only), PC A99/MF A01	DE84900571	STD -90	9:9219
ICTIS/TR-				
24	NTIS (US Sales Only), PC A04/MF A01	DE84900727	STD -90d	9:9304
IFE/KR/E-				
11V	NTIS (US Sales Only), PC A08/MF A01	DE83704600	MN -32	9:9847
16N	NTIS (US Sales Only), PC A02/MF A01	DE83704571	MN -80	9:9889
82/ 001V	NTIS (US Sales Only), PC A04/MF A01	DE83704551	MN -41	9:11398
ILL-RA-				
1982	NTIS (US Sales Only), PC A08/MF A01; 1	DE84750295	MN -2	9:10000
1983(Ann.)	NTIS (US Sales Only), PC A21/MF A01; 1	DE84750296	MN -2	9:10001
INDC(JAP)-				
82/ L	*See* JAERI-M-83-221		ND -34C	9:11118
INDC(NED)-				
7	*See* ECN-128	DE83704561	MN -23	9:10576
ININ-				
29	NTIS (US Sales Only), PC A02/MF A01	DE83704533	MN -4	9:10315
30	NTIS (US Sales Only), PC A02/MF A01	DE83704534	MN -4	9:10316
INIS-mf-				
8275	NTIS (US Sales Only), PC A13/MF A01	DE83704752	MN -41	9:9890
8276	NTIS (US Sales Only), PC A07/MF A01	DE83704751	MN -23	9:10784
8278	NTIS (US Sales Only), PC A05/MF A01	DE83704747	MN -86	9:9447
8282	NTIS (US Sales Only), PC A11/MF A01	DE83704730	MN -34A	9:10294
8284	NTIS (US Sales Only), PC A09/MF A01	DE83704763	MN -80	9:11361
8285	NTIS (US Sales Only), PC A11/MF A01	DE83704753	MN -41	9:9891
8286	NTIS (US Sales Only), PC A03/MF A01	DE83704762	MN -25	9:10439
8287	NTIS (US Sales Only), PC A13/MF A01	DE83704754	MN -41	9:9892
8288	NTIS (US Sales Only), PC A08/MF A01	DE83704755	MN -41	9:10006
8572	NTIS (US Sales Only), PC A16/MF A01	DE84780047	MN -41	9:10688
8632	NTIS (US Sales Only), PC A07/MF A01	DE83704731	MN -34A	9:11002
8634	NTIS (US Sales Only), PC A07/MF A01	DE83704745	MN -4	9:10387
8635	NTIS (US Sales Only), PC A04/MF A01	DE83704746	MN -4	9:10357
8637	NTIS (US Sales Only), PC A07/MF A01	DE83704725	MN -34A	9:11003
8638	NTIS (US Sales Only), PC A08/MF A01	DE83704734	MN -20	9:10047
8639	NTIS (US Sales Only), PC A07/MF A01	DE83704732	MN -34A	9:11045
8640	NTIS (US Sales Only), PC A06/MF A01	DE83704758	MN -48	9:10797
8644	NTIS (US Sales Only), PC A13/MF A01	DE83704756	MN -48	9:10798
8645	NTIS (US Sales Only), PC A07/MF A01	DE83704757	MN -48	9:10799
8646	NTIS (US Sales Only), PC A09/MF A01	DE83704759	MN -48	9:10800
8647	NTIS (US Sales Only), PC A15/MF A01	DE83704760	MN -48	9:10801
8649	NTIS (US Sales Only), PC A08/MF A01	DE84780051	MN -41	9:10008
8650	NTIS (US Sales Only), PC A05/MF A01	DE83704750	MN -48	9:10802
8651	NTIS (US Sales Only), PC A09/MF A01	DE83704726	MN -34A	9:11004
8653	NTIS (US Sales Only), PC A09/MF A01	DE83704748	MN -25	9:10233
8654	NTIS (US Sales Only), PC A06/MF A01	DE83704727	MN -34A	9:11005
8657	NTIS (US Sales Only), PC A08/MF A01	DE83704749	MN -48	9:10830
8658	NTIS (US Sales Only), PC A06/MF A01	DE83704728	MN -34A	9:11006
8661	NTIS (US Sales Only), PC A08/MF A01	DE83704733	MN -34A	9:10234
8662	NTIS (US Sales Only), PC A08/MF A01	DE83704729	MN -34A	9:11007

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INS-R-				
296	NTIS (US Sales Only), PC A02/MF A01	DE83704324	MN -41	9:10887
297	NTIS (US Sales Only), PC A02/MF A01	DE83704325	MN -41	9:10888
310	NTIS (US Sales Only), PC A02/MF A01	DE83704322	MN -23	9:10889
IPNO-				
83-01	NTIS (US Sales Only), PC A02/MF A01	DE84750298	MN -34C	9:11155
IPNO-TH-				
82-22	NTIS (US Sales Only), PC A03/MF A01	DE84750299	MN -34D	9:11077
IRT-				
23400/ 1	*See* DOE/EV/10341-T1	DE84004748	MN -11	9:11395
ISN-				
82-38	NTIS (US Sales Only), PC A03/MF A01	DE83704169	MN -37	9:10582
82-42	NTIS (US Sales Only), PC A02/MF A01; 1	DE84750297	MN -34C	9:11142
ITEF-				
39(1982)	NTIS (US Sales Only), PC A02/MF A01	DE83704171	MN -37	9:10583
88(1982)	NTIS (US Sales Only), PC A02/MF A01	DE83704172	MN -37	9:10584
143(1982)	NTIS (US Sales Only), PC A02/MF A01	DE83704186	MN -37	9:10452
145(1982)	NTIS (US Sales Only), PC A02/MF A01	DE83704170	MN -37	9:10585
IVL-B-				
722	NTIS (US Sales Only), PC A02/MF A01; 1	DE83751385	MN -11	9:10655
JACKFAU-				
83-302	*See* DOE/NASA/0295-1	DE84005013	STD -96	9:10130
JAERI-M-				
83-221	Japan Atomic Energy Research Inst., Tokai-mura, Naka-gun, Ibaraki-ken 319-11		ND -34C	9:11118
JINR-				
1-82-679	NTIS (US Sales Only), PC A02/MF A01	DE83704173	MN -37	9:10586
1-82-683	NTIS (US Sales Only), PC A02/MF A01	DE83704174	MN -37	9:10587
1-82-729	NTIS (US Sales Only), PC A02/MF A01	DE83704175	MN -37	9:10588
10-82-807	NTIS (US Sales Only), PC A02/MF A01	DE83704187	MN -37	9:10630
13-82-701	NTIS (US Sales Only), PC A02/MF A01	DE83704163	MN -80	9:9866
13-82-818	NTIS (US Sales Only), PC A02/MF A01	DE83704176	MN -37	9:10589
16-82-89	NTIS (US Sales Only), PC A02/MF A01	DE83704129	MN -41	9:11156
D-1,2-81-728	NTIS (US Sales Only), PC A16/MF A01	DE84780054	MN -34D	9:11050
E-2-82-779	NTIS (US Sales Only), PC A02/MF A01	DE83704450	MN -34D	9:11174
E-5-82-669	NTIS (US Sales Only), PC A02/MF A01	DE83704451	MN -34D	9:11113
JINR-R-				
3-82-770	NTIS (US Sales Only), PC A02/MF A01	DE83704601	MN -32	9:9854
13-82-634	NTIS (US Sales Only), PC A02/MF A01	DE83704177	MN -37	9:10590
13-82-893	NTIS (US Sales Only), PC A02/MF A01	DE83704178	MN -37	9:10591
13-82-905	NTIS (US Sales Only), PC A02/MF A01	DE83704581	MN -37	9:10592
K/OA-				
5578	NTIS, PC A03/MF A01; 1	DE84005259	MN -4	9:10349
KFKI-				
1983-08	NTIS (US Sales Only), PC A03/MF A01	DE83704573	MN -80	9:9855
1983-12	NTIS (US Sales Only), PC A02/MF A01	DE83704456	MN -20	9:11314
1983-28	NTIS (US Sales Only), PC A02/MF A01	DE83704473	MN -34B	9:10977
1983-37	NTIS (US Sales Only), PC A02/MF A01	DE83704569	MN -80	9:9833
1983-39	NTIS (US Sales Only), PC A02/MF A01	DE83704452	MN -34D	9:11110
1983-41	NTIS (US Sales Only), PC A03/MF A01	DE83704574	MN -80	9:9856
1983-45	NTIS (US Sales Only), PC A02/MF A01	DE83704582	MN -37	9:10594
1983-46	NTIS (US Sales Only), PC A02/MF A01	DE83704583	MN -37	9:10595
1983-50	NTIS (US Sales Only), PC A02/MF A01	DE83704457	MN -20	9:11315
KHM-TR-				
52	NTIS (US Sales Only), PC A08/MF A01; 1	DE83751384	MN -90i	9:9282
53	NTIS (US Sales Only), PC A04/MF A01; 1	DE83751379	MN -11	9:9765
56	NTIS (US Sales Only), PC A09/MF AA01; 1	DE83751395	MN -90i	9:9266
58	NTIS (US Sales Only), PC A05/MF A01; 1	DE83751386	MN -11	9:10656
59	NTIS (US Sales Only), PC A03/MF A01	DE83751396	MN -90i	9:9283
60	NTIS (US Sales Only), PC A03/MF A01	DE83751380	MN -11	9:10657
61	NTIS (US Sales Only), PC A03/MF A01	DE83751381	MN -90i	9:9317
62	NTIS (US Sales Only), PC A03/MF A01	DE83751382	MN -90e	9:10923
63	NTIS (US Sales Only), PC A03/MF A01; 1	DE83751383	MN -90i	9:9318
64	NTIS (US Sales Only), PC A03/MF A01	DE83751389	MN -41	9:10924
79	NTIS (US Sales Only), PC A06/MF A01	DE83751377	MN -41	9:9319
81	Statens Vattenfallsverk, Vaellingby, Sweden, Projekt KOL-HAELSA-MILJOE		ND -41	9:10925
94	NTIS (US Sales Only), PC A03/MF A01	DE83751391	MN -90i	9:9284
95	NTIS (US Sales Only), PC A03/MF A01	DE83751397	MN -90i	9:9298
103	NTIS (US Sales Only), PC A03/MF A01	DE83751392	MN -90i	9:9267
106	NTIS (US Sales Only), PC A04/MF A01	DE83751393	MN -90i	9:9285
107	NTIS (US Sales Only), PC A03/MF A01	DE83751394	MN -90i	9:9268
LA-				
9821-PR	NTIS, PC A05/MF A01	DE84004475	STD -15	9:9521
9829-MS	NTIS, PC A05/MF A01	DE84004532	STD -96	9:10196
9901-MS	NTIS, PC A02/MF A01	DE84004531	STD -28	9:10493
9910-MS-Vol.2	*See* NUREG/CR-3522-Vol.2	DE84005124	MN -25	9:9524
9929-MS	*See* NUREG/CR-3242	DE84005155	MN -11	9:10472
LA-tr-				
84-2	NTIS, PC A02/MF A01	DE84004675	MN -20f	9:11251
84-3	NTIS, PC A03/MF A01; 1	DE84004443	MN -20f	9:11250
LA-UR-				
83-2113	NTIS, PC A02/MF A01	DE83015249	MN -34	9:11046
83-2295	NTIS, PC A03/MF A01	DE83017308	MN -34D	9:11175
83-2515	NTIS, PC A02/MF A01; 1	DE84001389	MN -34B	9:10985

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83-2691	NTIS, PC A02/MF A01; 1	DE84004330	MN -20g	9:11316
83-3239	NTIS, PC A03/MF A01; 1	DE84003777	MN -34B	9:10986
83-3250	NTIS, PC A02/MF A01	DE84003781	MN -34C	9:11086
83-3395	NTIS, PC A02/MF A01; 1	DE84003840	MN -32	9:11396
83-3396	NTIS, PC A02/MF A01; 1	DE84003828	MN -32	9:11382
83-3397	NTIS, PC A02/MF A01; 1	DE84003826	MN -32	9:11383
83-3402	NTIS, PC A02/MF A01	DE84003827	MN -70	9:9481
83-3470	NTIS, PC A02/MF A01; 1	DE84004329	MN -21	9:11317
83-3476	NTIS, PC A02/MF A01; 1	DE84004328	MN -20f	9:11318
83-3477	NTIS, PC A02/MF A01	DE84004327	MN -32	9:10631
83-3480	NTIS, PC A02/MF A01; 1	DE84004326	MN -20f	9:11229
83-3481	NTIS, PC A02/MF A01; 1	DE84004323	MN -37	9:10771
83-3489	NTIS, PC A02/MF A01; 1	DE84004322	MN -20f	9:11319
83-3490	NTIS, PC A02/MF A01; 1	DE84004321	MN -20f	9:11320
83-3505	NTIS, PC A02/MF A01; 1	DE84004334	MN -20d	9:11321
83-3520	NTIS, PC A02/MF A01	DE84004331	MN -46	9:10638
83-3523	NTIS, PC A03/MF A01	DE84004332	MN -32	9:11047
83-3545	NTIS, PC A02/MF A01	DE84004227	MN -32	9:11181
83-3583	NTIS, PC A02/MF A01	DE84004319	MN -48	9:10926
83-3621	NTIS, PC A02/MF A01	DE84004316	MN -34B	9:10978
83-3717	NTIS, PC A02/MF A01; 1	DE84004376	MN -4	9:10271
LAL-				
83-09	NTIS (US Sales Only), PC A09/MF A01	DE84750294	MN -34D	9:11056
83-13	NTIS (US Sales Only), PC A02/MF A01	DE84750308	MN -28	9:10562
LAL-RT-				
83-07	NTIS (US Sales Only), PC A02/MF A01	DE84750307	MN -28	9:10563
LAPP-EXP-				
82-03	NTIS (US Sales Only), PC A03/MF A01	DE83704179	MN -37	9:10607
LBL-				
9143	NTIS, PC A09/MF A01; 1	DE84000542	STD -11	9:10443
15500	NTIS, PC A13/MF A01; 1	DE84003916	STD -13	9:9729
15958	NTIS, PC A02/MF A01; 1	DE84004311	MN -38	9:10608
16008	NTIS, PC A02/MF A01	DE84004310	MN -34D	9:10494
16117	NTIS, PC A07/MF A01; 1	DE84003288	MN -25	9:9599
16194	NTIS, PC A02/MF A01; 1	DE84004654	MN -32	9:11384
16550	NTIS, PC A02/MF A01	DE84003050	MN -25	9:10239
16551	NTIS, PC A03/MF A01	DE84001976	MN -25	9:11161
16573	NTIS, PC A04/MF A01	DE84004634	MN -25	9:10240
16622	NTIS, PC A02/MF A01	DE84002908	MN -96	9:10197
16633	NTIS, PC A11/MF A01; 1	DE84003299	MN -4	9:10380
16681	NTIS, PC A02/MF A01	DE84004314	MN -25	9:10241
16716	NTIS, PC A02/MF A01	DE84002916	MN -94c	9:9955
16732	NTIS, PC A02/MF A01; 1	DE84004651	MN -70	9:9482
16736	NTIS, PC A03/MF A01	DE84002901	MN -34D	9:11057
16747	NTIS, PC A02/MF A01	DE84004637	MN -34	9:11087
16778	NTIS, PC A08/MF A01; 1	DE84004315	MN -4	9:10297
16799	NTIS, PC A02/MF A01; 1	DE84004658	MN -34C	9:10609
16805	NTIS, PC A02/MF A01	DE84005176	MN -32	9:11385
16819	NTIS, PC A02/MF A01	DE84005199	MN -34D	9:11081
16828	NTIS, PC A02/MF A01	DE84004959	MN -4	9:10391
16833	NTIS, PC A02/MF A01; 1	DE84004346	MN -20	9:11322
16901	NTIS, PC A13/MF A01; 1	DE84004362	MN -48	9:10772
16903	NTIS, PC A02/MF A01	DE84004345	MN -20c	9:11323
16926	NTIS, PC A02/MF A01; 1	DE84004240	MN -28	9:10610
16939	NTIS, PC A02/MF A01	DE84004241	MN -20g	9:11324
16998	NTIS, PC A14/MF A01; 1	DE84005172	MN -4	9:10350
LITH-IKP-R-				
288	NTIS (US Sales Only), PC A03/MF A01	DE83751404	MN -60	9:9752
LITH-MAT-R-				
83-02	NTIS (US Sales Only), PC A03/MF A01	DE83704595	MN -2	9:11397
LPCC-T-				
82-03	NTIS (US Sales Only), PC A06/MF A01; 1	DE84750261	MN -11	9:10752
LRAP-				
21	NTIS (US Sales Only), PC A02/MF A01	DE83751403	MN -11	9:10658
22	NTIS (US Sales Only), PC A08/MF A01; 1	DE83751402	MN -4	9:10392
LUMEDW/MEOC-				
1014/ 01-71(1983)	NTIS (US Sales Only), PC A04/MF A01	DE83704558	MN -48	9:10803
LUMEDW/MEOK-				
1002/ 1-45(1983)	NTIS (US Sales Only), PC A03/MF A01	DE83704560	MN -48	9:10804
LUNFD6/NFAS-				
1003/ 1-130(1983)	NTIS (US Sales Only), PC A03/MF A01	DE83704474	MN -34B	9:10979
LUNFD6/NFFR-				
3041/ 1-11(1981)	NTIS (US Sales Only), PC A03/MF A01	DE83704562	MN -28	9:10516
LUTFD2/TFKF-				
3038/ 1-29(1983)	NTIS (US Sales Only), PC A03/MF A01	DE83704544	MN -34B	9:10690
LUTMDN/TMVK-				
3113/ 1-90/ (1983)	NTIS (US Sales Only), PC A05/MF A01; 1	DE83751398	MN -98	9:10045
ME-RT-				
82009	NTIS MF A01; 2	DE84005244	MN -60	9:9753
MLM-				
3093(OP)	NTIS, PC A02/MF A01	DE83016627	MN -4	9:10335
3125	NTIS, PC A04/MF A01	DE84004303	STD -4	9:9527
MLM-MU-				
83-71-0003	NTIS, PC A15/MF A01; 1	DE84005502	MN -89	9:9235

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MRC-TSR-				
2549	*See* AD-A-132838/4			9:10057
MST-LUFT-A-				
47	NTIS (US Sales Only), PC A02/MF A01	DE83751363	MN -11	9:10643
49	NTIS (US Sales Only), PC A03/MF A01; 1	DE83751364	MN -11	9:10644
50	NTIS (US Sales Only), PC A04/MF A01	DE83751365	MN -11	9:10645
57	NTIS (US Sales Only), PC A04/MF A01	DE83751367	MN -11	9:10646
58	NTIS (US Sales Only), PC A05/MF A01	DE83751369	MN -11	9:10647
67	NTIS (US Sales Only), PC A03/MF A01; 1	DE83751366	MN -11	9:10659
72	NTIS (US Sales Only), PC A03/MF A01; 1	DE83751368	MN -11	9:10648
MTR-				
7518	NTIS, PC A14/MF A01; 1	DE84002895	MN -90f	9:10040
NASA/CR-				
168183	*See* DOE/NASA/0295-1	DE84005013	STD -96	9:10130
168299	*See* DOE/NASA/0301-1	DE84005402	MN -96	9:10131
NASA-TM-				
83468	*See* DOE/NASA/51040-49	DE84005060	STD -96	9:10182
83535	*See* DOE/NASA/51040-50	DE84005397	STD -25	9:10183
NBS-BSS-				
147	NTIS, PC A11/MF A01	DE84900502	STD -59	9:9704
NBS-SP-				
457-7	*See* PB-83-250241			9:10075
542	NTIS, PC A05/MF A01; 1	DE84005445	MN -95d	9:10141
NBSIR-				
76-1008	NTIS, PC A03/MF A01	DE84005448	MN -95d	9:10142
81-2273	NTIS, PC A02/MF A01; 1	DE84005444	MN -95d	9:10143
NCEL-TN-				
1673	*See* AD-A-133072/9			9:10058
NE-				
1983-5	NTIS (US Sales Only), PC A03/MF A01	DE83751387	MN -61a	9:9600
NE-EO-				
82-12	NTIS (US Sales Only), PC A04/MF A01; 1	DE83751378	MN -61a	9:9601
NE-VIND-				
83-14	NTIS (US Sales Only), PC A03/MF A01; 1	DE83751399	MN -60	9:9754
NEANDC(J)-				
95/ U	*See* JAERI-M-83-221		ND -34C	9:11118
NFL-				
36	NTIS (US Sales Only), PC A06/MF A01	DE83704453	MN -34A	9:9867
NIIAR-				
12(527)	NTIS (US Sales Only), PC A02/MF A01	DE83704116	MN -25	9:10242
41(556)	NTIS (US Sales Only), PC A02/MF A01	DE83704117	MN -25	9:10243
NIIEFA-P-MO-				
0537	NTIS (US Sales Only), PC A02/MF A01	DE83704563	MN -28	9:10482
NMERDI-				
2-67-2238(2)	New Mexico Energy Research and Development Inst., Information Center, University of New Mexico, Suite M, 457 Washington SE, Albuquerque, NM 87106		MN -66b	9:9730
NP-				
3751371	NTIS (US Sales Only), PC A02/MF A01	DE83751371	MN -97e	9:9561
3751372	NTIS (US Sales Only), PC A08/MF A01	DE83751372	MN -60	9:9755
3770168	NTIS (US Sales Only), PC A03/MF A01; 1	DE83770168	MN -97e	9:9580
3770172	NTIS (US Sales Only), PC A06/MF A01; 1	DE83770172	MN -11	9:10002
4770095	NTIS (US Sales Only), PC A08/MF/A01	DE84770095	MN -88	9:9290
4770096	NTIS (US Sales Only), MF A01; 2	DE84770096	MN -88	9:9291
4770097	NTIS (US Sales Only), PC A05/MF A01; 1	DE84770097	MN -11	9:10469
4770098	NTIS (US Sales Only), PC A07/MF A01	DE84770098	MN -90	9:9236
4770099	NTIS (US Sales Only), PC A03/MF A01; 1	DE84770099	MN -92	9:9339
4770100	NTIS (US Sales Only), PC A04/MF A01; 1	DE84770100	MN -98	9:10029
4770101	NTIS (US Sales Only), PC A04/MF A01	DE84770101	MN -61a	9:9550
4770103	NTIS (US Sales Only), PC A12/MF A01; 1	DE84770103	MN -11	9:10696
4770104	NTIS (US Sales Only), PC A08/MF A01; 1	DE84770104	MN -38	9:10632
4770105	NTIS (US Sales Only), PC A09/MF A01; 1	DE84770105	MN -38	9:10428
4770106	NTIS (US Sales Only), PC A02/MF A01	DE84770106	MN -13	9:9981
4770107	NTIS (US Sales Only), PC A02/MF A01; 1	DE84770107	MN -13	9:9982
4770108	NTIS (US Sales Only), PC A08/MF A01; 1	DE84770108	MN -97b	9:10041
4770109	NTIS (US Sales Only), PC A06/MF A01	DE84770109	MN -88	9:9292
4770110	NTIS (US Sales Only), PC A02/MF A01	DE84770110	MN -61	9:9557
4770111	NTIS (US Sales Only), PC A09/MF A01	DE84770111	MN -95	9:10019
4770112	NTIS (US Sales Only), PC A24/MF A01	DE84770112	MN -95	9:10020
4770113	NTIS (US Sales Only), PC A14/MF A01; 1	DE84770113	MN -95	9:9983
4770114	NTIS (US Sales Only), PC A06/MF A01; 1	DE84770114	MN -41	9:10927
4770115	NTIS (US Sales Only), PC A02/MF A01	DE84770115	MN -92	9:10032
4770116	NTIS (US Sales Only), PC A08/MF A01; 1	DE84770116	MN -11	9:10928
4770117	NTIS (US Sales Only), PC A06/MF A01; 1	DE84770117	MN -41	9:10929
4770118	NTIS (US Sales Only), PC A07/MF A01; 1	DE84770118	MN -48	9:10930
4770119	NTIS (US Sales Only), PC A07/MF A01	DE84770119	MN -13	9:9989
4770120	NTIS (US Sales Only), PC A04/MF A01; 1	DE84770120	MN -61a	9:9996
4770121	NTIS (US Sales Only), PC A04/MF A01	DE84770121	MN -98	9:9970
4770124	NTIS (US Sales Only), PC A07/MF A01; 1	DE84770124	MN -4	9:10393
4770125	NTIS (US Sales Only), PC A07/MF A01	DE84770125	MN -88	9:10470
4770126	NTIS (US Sales Only), PC A07/MF A01	DE84770126	MN -88	9:10471
4770127	NTIS (US Sales Only), PC A07/MF 01	DE84770127	MN -88	9:9293
4900378	Institute of Gas Technology, 3424 South State St., IIT Center, Chicago, IL 60616		MN -90e	9:9305
4900392	NTIS, PC A02/MF A01	DE84900392	MN -98A	9:9990

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4900394	NTIS, PC A02/MF A01	DE84900394	MN -95d	9:10071
4900577	OCS Information Program, Office of Offshore Information Services, Minerals Management Service, MS 640, 12203 Sunrise Valley Dr., Reston VA 22091		MN -92a	9:9327
4900578	Nevada Bureau of Mines and Geology, Univ. of Nevada Reno, Reno, NV 89557, $12.00		MN -66a	9:9731
NRPB-R-				
133	HMSO, London, price Pound4.00		ND -41	9:10712
138	HMSO, London, price Pound4.00		ND -41	9:9518
NUREG-				
0020-Vol.7-No.8	NTIS, PC A18/MF A01 - GPO	DE84900728	MN -80	9:10010
0020-Vol.7-No.10	NTIS, PC A18/MF A01; 1 - GPO	DE84900583	MN -80	9:9771
0090-Vol.6-No.2	NTIS, PC A03/MF A01 - GPO	DE84900717	MN -80	9:9895
0485-Vol.5-No.10	NTIS, PC A04/MF A01; 1 - GPO	DE84900588	MN -80	9:9896
0519-Suppl.7	NTIS, PC A04/MF A01 - GPO $4.50	DE84900584	MN -78	9:9897
0540-Vol.5-No.9	NTIS, PC A24/MF A01; 1 - GPO	DE84900589	MN -2	9:10011
0540-Vol.5-No.10	NTIS, PC A99/MF A01; 1 - GPO	DE84900651	MN -2	9:9824
0580-Vol.12-No.10	NTIS, PC A04/MF A01 - GPO	DE84900692	MN -80	9:10012
0580-Vol.12-No.11	NTIS, PC A04/MF A01 - GPO	DE84900587	MN -80	9:10013
0750-Vol.18-No.1	NTIS, PC A08/MF A01 - GPO	DE84900716	MN -80	9:9825
0750-Vol.18-No.2	NTIS, PC A07/MF A01 - GPO	DE84900585	MN -2	9:9826
0804	NTIS, PC A99/MF A01; 1 - GPO $15.00	DE84900591	MN -70	9:9483
0871-Vol.2-No.4	NTIS, PC A04/MF A01; 1 - GPO	DE84900590	MN -80	9:9827
0881-Suppl.4	NTIS, PC A04/MF A01 - GPO $4.50	DE84900582	MN -78	9:9898
0892-Suppl.4	NTIS, PC A07/MF A01; 1 - GPO $5.50	DE84900580	MN -78	9:9899
0991-Suppl.1	NTIS, PC A05/MF A01 - GPO $4.75	DE84900594	MN -78	9:9900
1002	NTIS, PC A09/MF A01; 1 - GPO $6.00	DE84900691	MN -78	9:9901
1004	NTIS, PC A03/MF A01 - GPO $4.25	DE84900581	MN -78	9:9902
1038	NTIS, PC A99/MF A01; 1 - GPO $11.00	DE84900592	MN -78	9:9903
1041	NTIS, PC A02/MF A01 - GPO $3.25	DE84900579	MN -2	9:9828
NUREG/CP-				
0045-Vol.2	NTIS, PC A18/MF A01; 1 - GPO	DE84000513	MN -77	9:9904
NUREG/CR-				
2325	NTIS, PC A09/MF A01; 1 - GPO $6.00	DE84005652	MN -71	9:9452
3096	NTIS, PC A04/MF A01; 1 - GPO $4.00	DE84004652	MN -11	9:9908
3128	NTIS, PC A04/MF A01 - GPO $4.50	DE84004662	MN -2	9:9522
3143-Vol.2	NTIS, PC A14/MF A01; 1 - GPO $7.50	DE84900715	MN -11	9:10961
3165	NTIS, PC A06/MF A01 - GPO $5.00	DE84005092	MN -78	9:9858
3242	NTIS, PC A02/MF A01 - GPO	DE84005155	MN -11	9:10472
3332	NTIS, PC A99/MF A01; 1 - GPO $16.00	DE84004807	MN -41	9:10691
3343	NTIS, PC A07/MF A01; 1 - GPO $5.50	DE84005656	MN -70B	9:9519
3347-Vol.2	NTIS, PC A02/MF A01 - GPO $3.25	DE84004665	MN -2	9:9523
3391-Vol.1	NTIS, PC A05/MF A01 - GPO $4.50	DE84004657	MN -78	9:9838
3407	NTIS, PC A11/MF A01 - GPO	DE84004268	MN -78	9:9909
3427-Vol.2	NTIS, PC A06/MF A01 - GPO $4.75	DE84900667	MN -70	9:9484
3430-Vol.1	NTIS, PC A17/MF A01; 1 - GPO	DE84004142	MN -80	9:10014
3456	NTIS, PC A99/MF A01; 1 - GPO $12.00	DE84004655	MN -11	9:10660
3477	NTIS, PC A02/MF A01	DE84005146	MN -11	9:10931
3478	NTIS, PC A05/MF A01 - GPO	DE84004817	MN -11	9:10742
3480	NTIS, PC A07/MF A01; 1 - GPO	DE84005435	MN -11	9:9910
3488-Vol.1	NTIS, PC A03/MF A01 - GPO $3.75	DE84900725	MN -11	9:10661
3492-Vol.2	NTIS, PC A02/MF A01 - GPO	DE84004789	MN -77	9:9911
3522-Vol.2	NTIS, PC A02/MF A01 - GPO	DE84005124	MN -25	9:9524
3542	NTIS, PC A10/MF A01; 1 - GPO $6.00	DE84900627	MN -80	9:9859
3552	NTIS, PC A02/MF A01 - GPO $3.00	DE84900718	MN -11	9:10962
3553	NTIS, PC A03/MF A01 - GPO	DE84005324	MN -98	9:9971
3570	NTIS, PC A04/MF A01; 1 - GPO $4.50	DE84900593	MN -70B	9:9485
3574	NTIS, PC A03/MF A01 - GPO $4.00	DE84900629	MN -11	9:10713
3576	NTIS, PC A08/MF A01 - GPO $5.50	DE84900659	MN -38	9:10429
NVO-				
196-38	NTIS, PC A05/MF A01	DE84005313	STD -70	9:9486
265	NTIS, PC A03/MF A01	DE84005312	STD -70	9:9515
NYSERDA-				
83-5	New York State Energy Research and Development Authority, Albany, NY 12223		MN -66a	9:9732
83-18	Department of Communications, NY 12223SERDA, Two Rockfeller, Plaza, Albany, NY		MN -61a	9:9602
NZERDC-				
94	NTIS (US Sales Only), PC A02/MF A01	DE84900599	MN -95	9:10144
96	NTIS (US Sales Only), PC A02/MF A01	DE84900575	MN -12	9:10754
97	NTIS (US Sales Only), PC A05/MF A01	DE84900600	MN -90a	9:9263
OEFZS-LA-				
109/ 82	Oesterreichisches Forschungszentrum Seibersdorf G.m.b.h., Vienna (Austria)			9:10932
ONWI-				
190(4)	NTIS, PC A05/MF A01	DE84005202	STD -70	9:10966
ORNL-				
5962	NTIS, PC A04/MF A01	DE84005080	STD -41	9:10951
5968	*See* NUREG/CR-3332	DE84004807	MN -41	9:10691
5984	NTIS, PC A04/MF A01	DE84004150	MN -95a	9:10177
ORNL/NSIC-				
215-Vol.1	*See* NUREG/CR-3430-Vol.1	DE84004142	MN -80	9:10014
ORNL/Sub-				
80-13836/ 1-02	NTIS, PC A05/MF A01	DE84005072	MN -95d	9:10072
42539/ 3	NTIS, PC A05/MF A01	DE84004370	MN -94a	9:10073

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ORNL/TM-				
8376	NTIS, PC A03/MF A01	DE84004015	MN -70	9:9487
8722	NTIS, PC A04/MF A01	DE84005064	MN -61a	9:9558
8881	NTIS, PC A04/MF A01	DE84005078	MN -11	9:10933
8921-Vol.2	*See* NUREG/CR-3492-Vol.2	DE84004789	MN -77	9:9911
8952	NTIS, PC A02/MF A01	DE84005307	MN -34	9:10517
8986	NTIS, PC A03/MF A01	DE84005081	MN -37	9:10611
P-				
500-83-003	California Energy Commission, 1516 9th Street, Sacramento, CA 95814		MN -66i	9:9733
PATENTS-US-	(US: Commissioner of Patents, Washington, D.C. 20231, USA, $1.00 per copy. Government Patent Applications available from NTIS)			
A 6-453,068				9:10414
A 6-521,778				9:10306
PB-				
83-240481	NTIS, PC A03/MF A01			9:10074
83-242115	NTIS PC E03/MF E01			9:10145
83-248872	NTIS PC E03/MF E03			9:9785
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83-08	NTIS, PC A08/MF A01; 1	DE84004764	MN -20c	9:11325
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4561	*See* NUREG/CR-3343	DE84005656	MN -70B	9:9519
4812	NTIS, PC A04/MF A01	DE84004759	MN -94e	9:9943
4814	*See* NUREG/CR-3456	DE84004655	MN -11	9:10660
4815	NTIS, PC A04/MF A01	DE84005070	MN -90d	9:9238
4938	NTIS, PC A04/MF A01; 1	DE84005230	MN -70	9:9488
4958	NTIS, PC A04/MF A01	DE84005229	MN -41	9:10692
PNL-SA-				
9932	NTIS, PC A02/MF A02; 1	DE83002710	MN -32	9:11386
11338	NTIS, PC A02/MF A01	DE84004830	MN -37	9:10612
11617	NTIS (US Sales Only), PC A03/MF A01	DE84003351	MN -78	9:9912
11636	NTIS, PC A02/MF A01; 1	DE84004849	MN -78	9:9839
11639	NTIS, PC A03/MF A01	DE84001911	MN -48	9:10828
11681	NTIS (US Sales Only), PC A03/MF A01	DE84003355	MN -78	9:9850
11763	NTIS, PC A02/MF A01	DE84003959	MN -41	9:10934
11765	NTIS, PC A02/MF A01	DE84003982	MN -32	9:11387
11773	NTIS, PC A02/MF A01	DE84004843	MN -11	9:10968
11804	NTIS, PC A02/MF A01; 1	DE84004837	MN -37	9:10613
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435	NTIS, PC A02/MF A01; 1	DE84001197	MN -80	9:9830
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2038	NTIS, PC A02/MF A01	DE84000535	STD -20a	9:11326
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2055	NTIS, PC A03/MF A01	DE84003484	STD -20	9:11232
2056	NTIS, PC A03/MF A01	DE84004306	STD -20b	9:11233
2062	NTIS, PC A03/MF A01	DE84004297	STD -20a	9:11328
2064	NTIS, PC A03/MF A01	DE84004300	STD -20g	9:11234
2065	NTIS, PC A02/MF A01	DE84004305	STD -20f	9:11235
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8210/ 8213	NTIS (US Sales Only), PC A04/MF A01	DE83704535	MN -4	9:9913
RISO-M-				
2375	NTIS (US Sales Only), PC A02/MF A01	DE83704454	MN -34A	9:10200
2377	NTIS (US Sales Only), PC A05/MF A01; Also available from Risoe Library, Dk-4000 Roskilde, Denmark	DE83704603	MN -2	9:11362
2382	NTIS (US Sales Only), PC A03/MF A01	DE83704604	MN -2	9:11363
2392	NTIS (US Sales Only), PC A03/MF A01	DE83751370	MN -60	9:9756
RISO-R-				
474	NTIS (US Sales Only), PC A07/MF A01; Also available from Risoe Library, DK-4000 Roskilde, Denmark	DE83704570	MN -80	9:9775
477	NTIS (US Sales Only), PC A03/MF A01	DE83704547	MN -48	9:10806
RL-				
82-048	NTIS (US Sales Only), PC A04/MF A01	DE83704475	MN -34B	9:10987
82-109	NTIS (US Sales Only), PC A02/MF A01	DE83704564	MN -28	9:10483
82-120	NTIS (US Sales Only), PC A03/MF A01	DE83704181	MN -37	9:10614
83-009	NTIS (US Sales Only), PC A02/MF A01	DE83704458	MN -20	9:11236
SA-				
20191-3	*See* SKI-B-74-80	DE83704565	MN -25	9:10440
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SAAS-				
302	NTIS (US Sales Only), PC A13/MF A01	DE83704326	MN -41	9:10890
303	NTIS (US Sales Only), PC A02/MF A01	DE83704327	MN -41	9:11329
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83-1147/ PRI-71	NTIS, PC A04/MF A01	DE84004896	MN -20	9:11237
83/ 1193	NTIS, PC A03/MF A01	DE84005394	STD -20g	9:11330
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75-0079	NTIS, PC A03/MF A01; 1	DE84005251	MN -62e	9:9722
81-0118	*See* NUREG/CR-2325	DE84005652	MN -71	9:9452
82-0679	*See* NUREG/CR-3128	DE84004662	MN -2	9:9522
82-8048	NTIS, PC A10/MF A01; 1	DE84000626	STD -62c	9:9689
83-0130	NTIS, PC A04/MF A01	DE84005063	STD -66c	9:9739
83-1376C	NTIS, PC A02/MF A01; 1	DE84000052	MN -32	9:11388
83-1553	NTIS, PC A04/MF A01	DE84002705	MN -70	9:10967
83-1576	*See* NUREG/CR-3407	DE84004268	MN -78	9:9909
83-1874C	NTIS, PC A02/MF A01	DE83017160	MN -32	9:11389
83-1910C	NTIS, PC A02/MF A01; 1	DE84003210	MN -78	9:9914
83-1973C	NTIS, PC A02/MF A01; 1	DE84000450	MN -80	9:9868
83-2072C	NTIS, PC A02/MF A01	DE83018234	MN -32	9:11390
83-2096	NTIS, PC A02/MF A01	DE84001420	MN -92a	9:9328
83-7081-Vol.2	*See* NUREG/CR-3347-Vol.2	DE84004665	MN -2	9:9523
83-7455C	NTIS, PC A03/MF A01; 1	DE84003140	MN -70	9:10970
83-7462	NTIS, PC A06/MF A01; 1	DE84005395	MN -92a	9:9322
SERI/PR-				
255-2148	NTIS, PC A04/MF A01; 1	DE84000094	MN -63	9:9723
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612-965	NTIS, PC A03/MF A01; 1	DE84005380	MN -63	9:9609
642-1037	NTIS, PC A99/MF A01 - GPO	DE84005105	MN -58	9:9585

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722-1289	NTIS, PC A07/MF A01	DE84005373	MN -95d	9:10082
722-1296	NTIS, PC A05/MF A01; 1	DE84003589	MN -59	9:9705
744-1126	NTIS, PC A07/MF A01; 1	DE84003396	MN -58	9:9583
751-1051	NTIS, PC A05/MF A01	DE84003463	MN -58c	9:9590
SERI/STR-				
211-2086	NTIS, PC A04/MF A01; 1	DE84000030	STD -60	9:9744
SERI/TP-				
211-2125	NTIS, PC A02/MF A01; 1	DE84000023	STD -63e	9:9610
SERI/TR-				
214-1743	NTIS, PC A04/MF A01	DE84000011	STD -58a	9:9611
214-1965	NTIS, PC A08/MF A01; 1	DE84000029	STD -63a	9:9589
252-1310	NTIS, PC A05/MF A01; 1	DE84000059	STD -61a	9:9539
255-1602	NTIS, PC A06/MF A01; 1	DE84000025	STD -59	9:9724
9318-2-T1	NTIS, PC A03/MF A01	DE83017780	MN -63b	9:9612
SIS-				
1981:13	NTIS (US Sales Only), PC A02/MF A01	DE83704548	MN -48	9:10714
1982:2	NTIS (US Sales Only), PC A02/MF A01	DE83704554	MN -41	9:10947
1982:8	NTIS (US Sales Only), PC A02/MF A01	DE83704328	MN -41	9:10715
1983:2	NTIS (US Sales Only), PC A03/MF A01	DE83704555	MN -41	9:10948
SKBF-KBS-TR-				
82-12	NTIS (US Sales Only), PC A03/MF A01	DE83704590	MN -70	9:9489
82-15	NTIS (US Sales Only), PC A03/MF A01	DE83704591	MN -70	9:9490
82-16	NTIS (US Sales Only), PC A02/MF A01	DE83704592	MN -70	9:10716
82-17	NTIS (US Sales Only), PC A02/MF A01	DE83704593	MN -70	9:10298
83-01	NTIS (US Sales Only), PC A02/MF A01	DE83704594	MN -70	9:10717
83-02	NTIS (US Sales Only), PC A03/MF A01	DE83704588	MN -70	9:9491
SKI-B-				
3-81	*See* STUDSVIK-NF(P)-82-72	DE83704575	MN -78	9:9777
13-82	NTIS (US Sales Only), PC A03/MF A01	DE83704577	MN -78	9:9786
30-82	*See* STUDSVIK-NF(P)-82-72	DE83704575	MN -78	9:9777
61-81	NTIS (US Sales Only), PC A05/MF A01	DE83704537	MN -25	9:9776
74-80	NTIS (US Sales Only), PC A04/MF A01	DE83704565	MN -25	9:10440
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264	NTIS, PC A04/MF A01; 1	DE84005017	STD -34D	9:11058
SLAC-CN-				
232	NTIS, PC A02/MF A01; 1	DE84005035	MN -28	9:10495
SLAC-PUB-				
3245	NTIS, PC A02/MF A01	DE84003858	MN -34D	9:11059
3247	NTIS, PC A02/MF A01	DE84003862	MN -34D	9:11060
3262	NTIS, PC A02/MF A01	DE84005326	MN -34D	9:11061
SLU-ISK-				
142	NTIS (US Sales Only), PC A05/MF A01; 1	DE83751400	MN -61a	9:9613
145	NTIS (US Sales Only), PC A05/MF A01; 1	DE83751401	MN -61a	9:9614
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133	*See* NE-EO-82-12	DE83751378	MN -61a	9:9601
SLU-LBT-				
30	NTIS (US Sales Only), PC A06/MF A01; 1	DE83751388	MN -59c	9:9706
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53	NTIS (US Sales Only), PC A02/MF A01	DE83704540	MN -51	9:10791
54	NTIS (US Sales Only), PC A02/MF A01	DE83704320	MN -48	9:10792
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1647	NTIS (US Sales Only), PC A03/MF A01	DE83751413	MN -11	9:10708
1657	NTIS (US Sales Only), PC A03/MF A01	DE83751411	MN -61a	9:9615
1658	NTIS (US Sales Only), PC A03/MF A01	DE83751412	MN -11	9:10743
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83/ 14	NTIS, PC A03/MF A01	DE84004044	STD -59	9:9707
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82-19	NTIS (US Sales Only), PC A02/MF A01	DE83704584	MN -37	9:10615
82-25	NTIS (US Sales Only), PC A03/MF A01	DE83704556	MN -41	9:10693
83-01	NTIS (US Sales Only), PC A02/MF A01	DE83704545	MN -34B	9:10694
83-04	NTIS (US Sales Only), PC A02/MF A01	DE83704552	MN -41	9:9860
83-07	NTIS (US Sales Only), PC A03/MF A01	DE83704329	MN -41	9:10718
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82-06	NTIS (US Sales Only), PC A02/MF A01	DE83704557	MN -41	9:9861
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84-6386	*See* UCRL-15567	DE84004791	MN -38	9:10430
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82-72	NTIS (US Sales Only), PC A05/MF A01	DE83704575	MN -78	9:9777
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1-14	NTIS (US Sales Only), PC A03/MF A01	DE83704602	MN -32	9:9840
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82-06	NTIS (US Sales Only), PC A03/MF A01	DE83704459	MN -20	9:11176
82-08	NTIS (US Sales Only), PC A06/MF A01	DE83704546	MN -34B	9:10988
82-09	NTIS (US Sales Only), PC A02/MF A01	DE83704460	MN -20	9:10980
82-10	NTIS (US Sales Only), PC A02/MF A01	DE83704461	MN -20	9:11238
82-12	NTIS (US Sales Only), PC A02/MF A01	DE83704462	MN -20	9:10453
82-13	NTIS (US Sales Only), PC A03/MF A01	DE83704463	MN -20	9:11239
82-14	NTIS (US Sales Only), PC A03/MF A01	DE83704464	MN -20	9:11240
82-15	NTIS (US Sales Only), PC A02/MF A01	DE83704465	MN -20	9:11241
TRITA-PFU-				
82-11	NTIS (US Sales Only), PC A03/MF A01	DE83704466	MN -20	9:11242

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82-14	NTIS (US Sales Only), PC A02/MF A01	DE83704468	MN -20	9:11244
83-01	NTIS (US Sales Only), PC A03/MF A01	DE83704469	MN -20	9:11245
83-03	NTIS (US Sales Only), PC A03/MF A01	DE83704470	MN -20	9:11246
TVA/ONR/WR-				
84/ 1	NTIS, PC A10/MF A01; 1	DE84900614	MN -97e	9:9560
TVA/ONR/WRF-				
83/ 20	NTIS, PC A02/MF A01	DE84900615	MN -79p	9:10755
TVA/OP/EC-R-				
82/ 92	NTIS, PC A02/MF A01	DE84900365	MN -59	9:9708
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84/ 4	NTIS, PC A11/MF A01; 1	DE84900617	MN -97a	9:9770
84/ 5	NTIS, PC A03/MF A01	DE84900619	MN -90a	9:9264
84/ 7	NTIS, PC A12/MF A01; 1	DE84900616	MN -90i	9:9269
84/ 8	NTIS, PC A02/MF A01	DE84900620	MN -90a	9:9299
TVA/PUB-				
84/ 15	NTIS, PC A04/MF A01	DE84900622	MN -95f	9:10150
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19323-83-2	NTIS, PC A03/MF A01	DE84001085	MN -38	9:10441
19925	NTIS, PC A02/MF A01	DE84005115	MN -38	9:10454
19933	NTIS, PC A03/MF A01	DE84005075	MN -38	9:11399
19943	NTIS, PC A02/MF A01	DE84005225	MN -20a	9:11247
19948	NTIS, PC A04/MF A01; 1	DE84004354	MN -21	9:11331
19952	NTIS, PC A13/MF A01	DE84004668	MN -2	9:10473
19953-Vol.1	NTIS, PC A08/MF A01	DE84005138	MN -92	9:9373
19958	NTIS, PC A10/MF A01; 1	DE84005061	MN -11	9:9915
19960	NTIS, PC A03/MF A01	DE84005114	MN -34	9:11048
19964	NTIS, PC A04/MF A01	DE84005227	MN -4	9:10635
19966	NTIS, PC A03/MF A01	DE84005224	MN -34C	9:11143
19968	NTIS, PC A02/MF A01	DE84005111	MN -70	9:9492
19972	NTIS, PC A03/MF A01	DE84005223	MN -28	9:11148
19973	NTIS, PC A03/MF A01	DE84005222	MN -34C	9:11139
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15516	NTIS, PC A05/MF A01; 1	DE84004795	MN -70	9:9493
15565	NTIS, PC A02/MF A01; 1	DE84004188	MN -20	9:11332
15566	NTIS, PC A11/MF A01; 1	DE84004761	MN -94b	9:9946
15567	NTIS, PC A04/MF A01	DE84004791	MN -38	9:10430
15568-1	NTIS, PC A24/MF A01; 1	DE84003955	MN -97b	9:9759
15568-2	NTIS, PC A08/MF A01	DE84003904	MN -97b	9:10455
15570	NTIS, PC A08/MF A01	DE84004741	MN -32	9:11391
15571	NTIS, PC A02/MF A01	DE84004805	MN -20d	9:11333
53487	*See* NUREG/CR-3477	DE84005146	MN -11	9:10931
53488	*See* NUREG/CR-3478	DE84004817	MN -11	9:10742
53489	*See* NUREG/CR-3480	DE84005435	MN -11	9:9910
86245-Rev.1	NTIS, PC A02/MF A01	DE84004408	MN -80	9:9916
88687	NTIS, PC A03/MF A01	DE84004361	MN -11	9:10935
89190	NTIS, PC A02/MF A01; 1	DE84004794	MN -11	9:10963
89212-Rev.1	NTIS, PC A02/MF A01	DE84004760	MN -34A	9:9530
89214-Rev.1	NTIS, PC A03/MF A01	DE84004077	MN -28	9:10496
89285	NTIS, PC A02/MF A01; 1	DE84004079	MN -20a	9:11334
89299-Rev.1	NTIS, PC A02/MF A01	DE84004812	MN -38	9:10445
89400	NTIS, PC A02/MF A01; 1	DE84004365	MN -25	9:10431
89430	NTIS, PC A02/MF A01	DE83015841	MN -21	9:11248
89433	NTIS, PC A02/MF A01	DE84004793	MN -20a	9:11335
89459	NTIS, PC A03/MF A01	DE84004061	MN -11	9:10336
89471-Rev.1	NTIS, PC A02/MF A01	DE84004191	MN -34A	9:10497
89476	NTIS, PC A02/MF A01	DE84004417	MN -70	9:10246
89507	NTIS MF A01; 2	DE84000178	MN -38	9:10456
89726	NTIS, PC A02/MF A01	DE84004814	MN -20f	9:11336
89759	NTIS, PC A02/MF A01; 1	DE84004190	MN -21	9:11337
89838	NTIS, PC A03/MF A01	DE84004785	MN -38	9:10457
89986	NTIS, PC A02/MF A01	DE84003246	MN -13	9:10406
89987	NTIS, PC A02/MF A01	DE84004792	MN -20a	9:11338
90030	NTIS, PC A02/MF A01	DE84003735	MN -38	9:11392
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DE84780047	INIS-mf—8572
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TZ United Republic of Tanzania

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UG Uganda
US United States of America (USA)
UY Uruguay

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VS Republic of Vietnam

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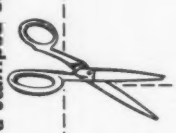

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